THE PAN AMERICAN UNION

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Glances at
PORTS AND HARBORS
around
SOUTH AMERICA

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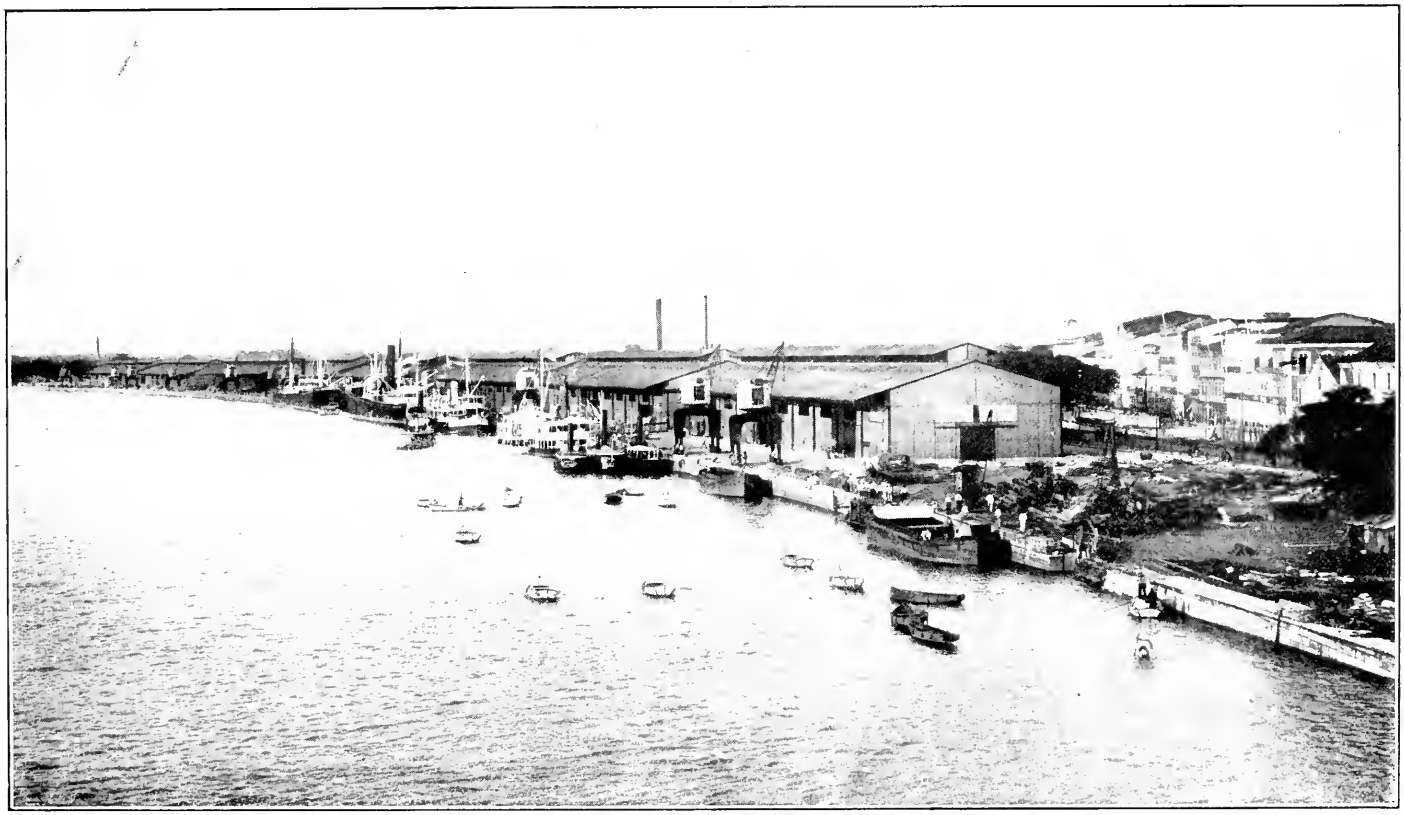


A SECTION OF THE MODERN DOCKS AT PARA (BELEM), BRAZIL.

Para is about 100 miles from the mouth of the Amazon. A deep channel leads from the main river to the port and docks. In a recent year 3,637 steam and sailing vessels entered this port, transporting thither $29,000,000 worth of goods and bearing away $48,000,000 worth of rubber and other raw products from the Amazon and its tributaries.

GLANCES *at* PORTS *and* HARBORS AROUND SOUTH AMERICA

By WILLIAM A. REID, Trade Adviser, Pan American Union

THE skipper who sailed to South American seaports a decade or more ago found it necessary to anchor his ship far out in the harbor or roadstead, as the case happened to be, and passengers and cargo were taken ashore in launches, rowboats, or lighters. Modern docking facilities were few. Today in many ports along South America's 16,000 miles of seashore the lack of port and harbor facilities is still a handicap to shipping; but in considering the more important ports we find that millions of dollars have been expended on improvements during recent years. Indeed, the voyager of former days is amazed on revisiting the continent to see the marked changes that stand today as monuments of progress. Financial outlays have been enormous; yet, in numerous cases, the work already completed is but a portion of greater facilities that have been planned to meet the growing needs. Each port, if we delved into details, could easily furnish material for a volume; space, however, is available for little beyond a statement of main features of progress.

Nature has been kinder to the mariner in providing a vast number of sheltered bays, inlets, and rivers along the eastern coast of the Continent than is the case on the Pacific side. From the Straits of Magellan to Panama on the Pacific there is nothing to compare with the natural facilities of the opposite coast line. Thus, the stormier ocean possesses the larger number of havens for those who sail the seas.

Comparing South America's northern shore line with the narrow southern extremity we also note marked contrasts. In the north there are bays and rivers offering the mariner ample protection, and at a few ports the waters are usually so tranquil that it is proverbially said that ships may be anchored by hairs. More than four thousand miles southward the Humboldt current sweeps up from Antarctic wastes and with its winds and waves dashes against the 1,400-foot sentinel, Cape Horn, with constant and well-known fury.

Sailing southward from New York with a view of casually inspecting some of the port improvements, our first call on South America might be at Para, that great rubber-shipping center which gives its name to vast quantities of this now universally needed article. Para, or Belem, as it is officially called to distinguish it from the State of Para, has grown because the world has annually demanded greater quantities of its products, or perhaps more strictly speaking, the products that

SCENES ON THE NORTHERN COAST OF BRAZIL.

Left: A front view of the dry dock at Para, which receives many ocean vessels as well as the smaller ships that ply up and down the Amazon. On this great river ocean ships proceed upstream for more than 2,300 miles to Iquitos in Peru. Right: A section of the breakwater at Pernambuco, the foundation of which is the natural reef extending between the inner and outer waters of the port.

come down the 40,000 miles of the Amazon and its tributary rivers from Bolivia, Peru, and Brazil.

In a recent year, 3,637 steam and sailing vessels cleared from Para; they carried thither more than $29,000,000 worth of goods and bore away $48,000,000 in rubber and other tropical products. Only a glance at this enormous trade is necessary to show a large revenue, for the country exacts taxes on its exports. A pleasing and growing revenue suggested better port facilities. About this time the capitalist, looking around for investments, decided on Para, and the Brazilian Government granted concessions to the Port of Para Co., a Maine (U. S. A.) corporation. Two years later, or in 1909, the first units of gigantic improvements were finished and inaugurated, and since that date ships have warped to modern docks.

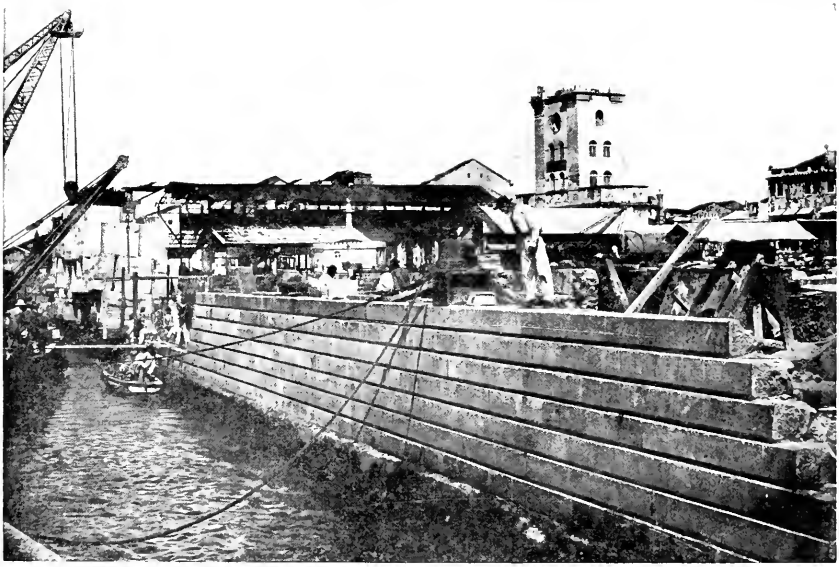
Today a mile or more of wall stretches along Para's water front, and the company above named has the privileges of conducting port services, operation of warehouses, quays, etc., for 30 miles—nearly equal distances up and down the river from the city proper. These concessions continue for 65 years, or if additional improvements are constructed, the privilege may be extended 25 years.

Para, more properly speaking, situated on the Para River, is nearly 100 miles from the ocean. A channel 30 feet deep leads from the main river to the actual wall where ships dock. The channel requires frequent dredging, as the river brings down a vast amount of silt and much of the latter finds its way seaward via Para. The largest steamers, however, are able to go to the docks at all seasons, and modern electric cranes handle cargo directly from the many new warehouses that line the waterfront. The city itself, with its 250,000 people, has improved its streets and parks in recent years, and strangers find it interesting largely on account of its contact with upper Amazon life and activity.

Seven hundred miles southeastward, passing many smaller ports, stands Brazil's most eastern city and port, Pernambuco (Recife). The population numbers 150,000 and, by reason of years of former Dutch occupation, the city has possibly a more Dutch-like appearance than any other of Brazil.

A great reef extending along the shore for many miles has long been an obstacle to sea commerce, as only smaller vessels were able to navigate the shallow course into the inner harbor. The traveler going ashore from a large vessel anchored off the reefs of Pernambuco often has the basket experience—that of descending into the ship tender or launch by this means, owing to rough waters.

Pernambuco has planned to spend several millions more in providing better shipping facilities. Certain parts of the outer reef are to be blown up and a deep-water course thus provided for entrance



PHASES OF CONSTRUCTION WORK AT PERNAMBUCO, BRAZIL.

Upper: The great breakwater being built on the reefs between the harbor and the ocean. Before the construction of this bulwark the waves of the Atlantic dashed over the reefs with great fury. Lower: A completed section of the wall of the inner port. Note the splendid stonework, the material for which was obtained near Pernambuco. Back of this wall solid earth has been used as a filler and the sea front considerably enlarged.

AT THE PORT OF BAHIA, BRAZIL.

Upper: One of the big vessels of the Lloyd Brazileiro (Brazilian Line) at her dock. This is the Minas Geraes, and is a fair type of the Brazilian ships plying between Brazil and New York. Lower: Scene on the water front of the lower city.

of ships into the inner bay; extensive quay walls, additional warehouses and other improvements for making a first-class port are in process of construction. The great war checked operations but much has already been accomplished, such as the building of breakwaters, sea walls, quarrying stone, and in otherwise getting the work well under way.

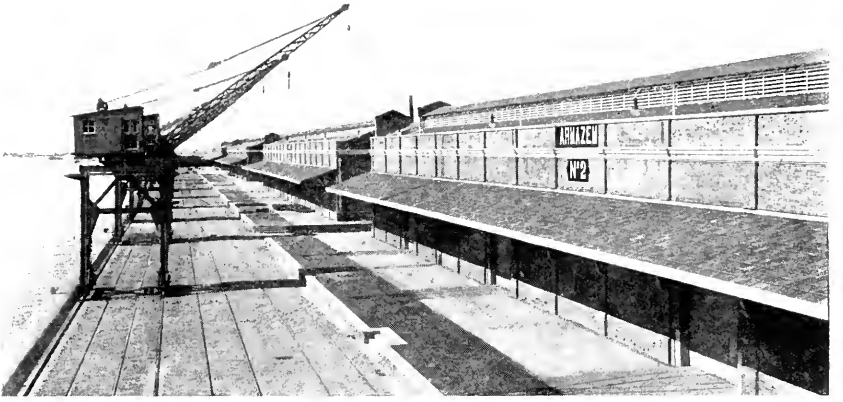
Southward 382 miles stands Brazil's third city of importance, Bahia. This city has completed a portion of the port improvements which began on an extensive scale in 1909, and which were inaugurated four years later. When the plans are carried to completion a sum of more than $20,000,000 will be represented in harbor improvements. Bahia will have added a wall and quay 500 to 600 feet wide for a distance of 2 miles. Fifteen or more warehouses, each 300 by 65 feet, are included in the betterment plans, and several of these buildings have been finished and are in use. Steam cranes, some of which are already in service, range in lifting capacity from 3 to 10 tons.

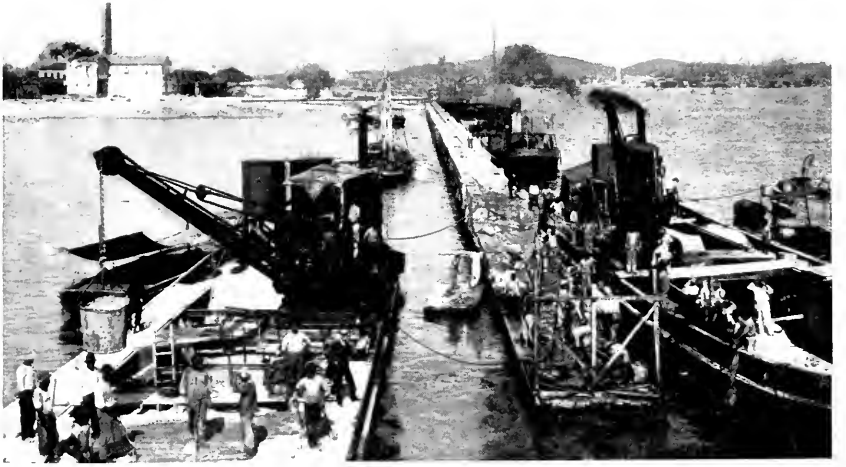
The Bay of Bahia is 25 miles long and 20 miles wide with an entrance about 2 miles broad. Usually, we see ships from all the world anchored in or moving about this great body of smooth water.

There are three practical methods for the hurried visitor to Rio de Janeiro (738 miles southward) to see one of the world's largest and most picturesque harbors, which is always alive with ships and shipping. Sugar Loaf Peak, guarding the entrance from the Atlantic, stands nearly 1,000 feet above the placid waters by which it is almost surrounded. An aerial cable railway operating hanging cars was constructed from lower levels to the top of this great sentinel. The view over the harbor, bays, and inlets is intensely beautiful. Corcovado, almost double the height of the nearer peak, rises commandingly over the city and offers a still better and grander view. After seeing the harbor in this manner we take a steam launch and spend a day in little voyages here and there about the bay, large enough to shelter the ships of many nations, being 17 miles long and 15 miles wide. The bottle-like entrance is considerably less than 1 mile in width.

A few years ago the vessel arriving at Rio de Janeiro cast her anchor a half mile or so from shore and passengers and freight were slowly landed by means of small boats and lighters. Today, how different! The ship draws up to one of the vacant spaces along the miles of wall that have been constructed on the waterfront; the passenger walks down the gang plank and into one of the great warehouses standing at intervals along the wall.

A loan of over $40,000,000 was made to Brazil by the house of Rothschild, and in 1904 construction of Rio de Janeiro's docks on a gigantic scale was commenced. A commission was appointed whose members had charge of the various phases of the work. The plan,





THREE PHASES OF PORT CONSTRUCTION AT RIO DE JANEIRO, BRAZIL.

Upper: One of the great sea walls under construction. After completion the water on the left of the wall was drawn to the outer bay and the area filled in with solid earth. Center: Completed section of piers showing the gigantic cranes, which move on steel tracks as required, and several of the warehouses. Lower: A section of the sea wall nearing completion.

HARBOR AND BAY OF RIO DE JANEIRO.

Upper: One of the beautiful passenger landings at Rio de Janeiro, known as the Pharoux, but not so generally used since the construction of larger docks. Lower: A view of the Bay, showing Botafogo, a residential section of Rio de Janeiro.

already executed to a large degree, called for the filling in of shallow areas along the edge of certain parts of the bay between the old shore line and the new sea walls. The first space behind the walls was set apart for cargo loading and unloading, next a wide strip of land was utilized for warehouses, while a still wider space was destined for new avenues in connection with Beira Mar, Central, and other famous thoroughfares of the Brazilian capital.

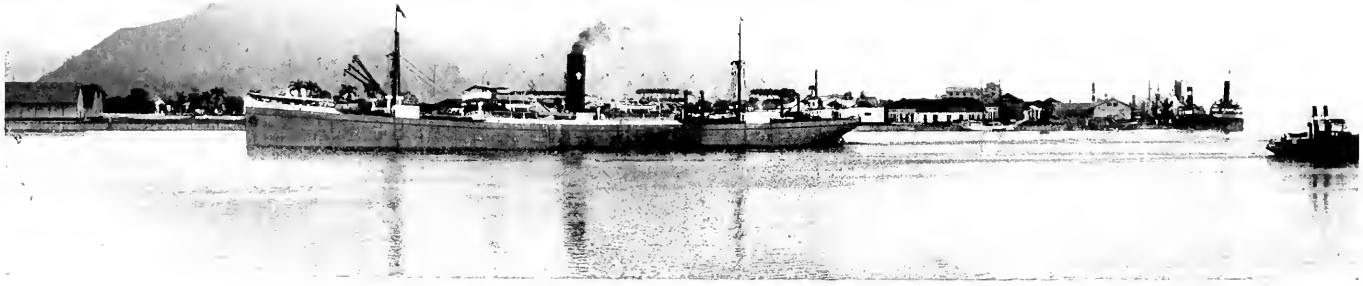
To the engineer and the builder the miles of walls that act as a buffer against the breakers or that serve as safe anchorages for ships are among the most attractive features of the modern development of Rio de Janeiro. The stonework is a marvel of beauty, strength, and permanency.

The next great seaport south of Rio de Janeiro is Santos, 225 miles distant, and a course usually covered by the average ship in a night. Santos is especially interesting to the traveler, as it is the world's greatest coffee mart. If one arrives between August and January, the season of shipping activity, he will see the docks and warehouses veritable beehives of activity.

Like other Brazilian ports, Santos has constructed an extensive quay or wall along the waterfront, this improvement extending for nearly 3 miles. Trains loaded with coffee are run onto the wall and hydraulic cranes capable of raising 5 to 30 tons or more do the work of hundreds of men. There are times, however, when a large army of laborers carry the bags of coffee aboard ship. Along this waterfront are many large warehouses lighted by electricity, modernly ventilated, fitted with traveling cranes, and otherwise provided for handling coffee on a gigantic scale. Brazil's average crop is approximately 12,000,000 sacks of 60 kilos (132.76 pounds) each, the great bulk of which is shipped from Santos.

The port of Rio Grande do Sul is about 600 miles south of Santos. Along the southeast shore of Brazil lie several lakes and lagoons, the largest being Lagôa dos Patos, a body of water extending north and south 150 miles with a width of from 10 to 40 miles, separated from the ocean by a sand dune strip averaging 5 miles in width. A number of rivers and lagoons pour their waters into the larger lake; the latter empties into the Atlantic by the Rio Grande do Sul, more like an arm of the sea than a river.

Three Brazilian ports are reached through this waterway: Rio Grande do Sul, Pelotas, and Porto Alegre, rivals for maritime trading, although the average ocean vessel can go no farther than the first mentioned port. The populations of these cities are 30,000, 35,000, and 150,000, respectively. The former being the ocean port (8 miles from the sea), it is there that millions of dollars have been spent in dredging and improving the harbor. To some extent at least the



SANTOS, THE WORLD'S GREATEST COFFEE PORT.

Upper: General view of a part of the upper bay with lighthouse on the left. Lower: View of the harbor. On the right may be seen a number of ocean ships moored at the modern docks. The vessel in the foreground is the Northern Prince leaving the port with 116,292 bags of coffee; at Rio de Janeiro 9,615 bags and at Bahia 2,720 bags were added to her cargo. When the ship sailed for New York she transported a total of 128,627 bags of coffee.

A SECTION OF THE NEW WATER FRONT AT RIO GRANDE DO SUL, BRAZIL.

This port is about 8 miles from the ocean, the connecting link being the river of the same name, but more properly an arm of the sea. By constructing breakwaters the current was made to deepen its own course. Pelotas and Porto Alegre are reached via Rio Grande do Sul; also there are railroad connections.

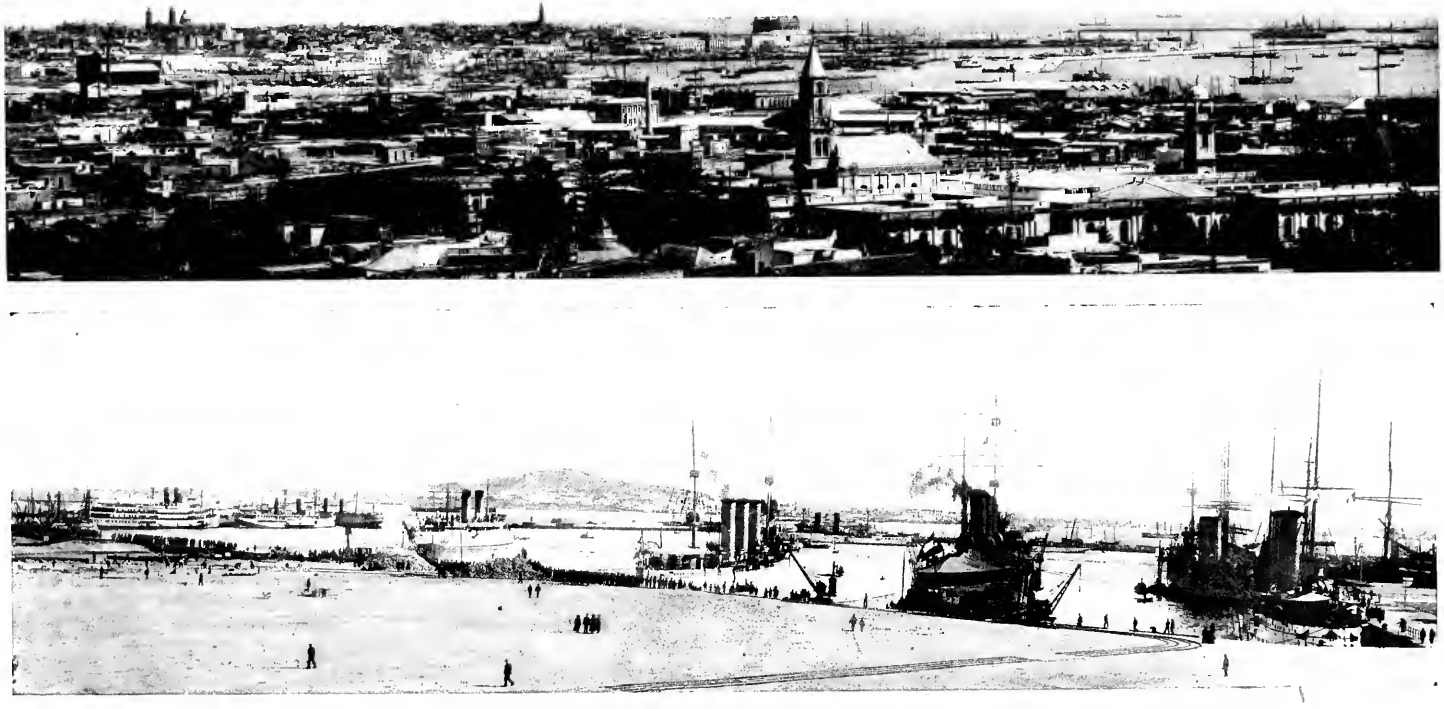
outward flow of water was made to deepen its own channel by the construction of especially arranged concrete sea walls and jetties. In the harbor proper much land has been reclaimed behind the new wall, the latter now being of sufficient length to accommodate from 7 to 10 average-size merchant vessels at the same time. Powerful and modern facilities for handling cargo are in use. There are numerous warehouses. The port properties are controlled by the Brazilian Railway Co. and its trains run directly onto the dock wall, alongside of which ships of 25-feet draft or more may anchor.

Those who have not seen Montevideo for a decade or longer, and who were accustomed to view the tedious handling of cargo as drivers urged their mule carts out into the water of the sandy beaches and there delivered products to lighters for another transshipment aboard the ship in the bay, will be amazed to inspect the port facilities today.

The Bay of Montevideo may be compared in form to a gigantic horseshoe opening toward the southwest, the entrance between Lobos and San José points being about 2 miles wide. The harbor is not naturally a deep one and a vast amount of dredging has been done to accommodate the constantly increasing ocean traffic.

Early in 1901 the Government of Uruguay began work on a very extensive scale to deepen the harbor and to construct the port on modern lines. Among the first purchases was dredging machinery which cost the sum of $1,000,000, an outlay which at once suggested the important work to follow its use. For 10 years thereafter Uruguay expended more than $1,000,000 annually for improving Montevideo's shipping facilities, not to mention the large funds spent on her inland ports, and by 1910 a sum in excess of $15,000,000 had been paid for the work. Not only has dredging been continued but sea walls or breakwaters have gradually been lengthened into the harbor. The eastern wall is more than 3,000 feet long, while the western one is nearly a mile in length. At the end of each wall is a flashing light to aid the mariner.

The main provisions, which have been carried out to a considerable extent, call for dredging certain portions of the harbor to a depth of 32 feet below low-water mark; another area has been deepened to 16 feet below low water, the latter for the use of smaller coasting vessels. There are several moles completed and alongside of these ocean ships now warp for the discharge and loading of passengers and cargo. One of these moles has 15 traveling cranes and 6 fixed ones, all worked by steam and capable of lifting from 2 to 4 tons. Other completed moles are similarly equipped, while additional moles planned or under construction will offer still better facilities. Several floating cranes are owned by the company working on the contract, one of which has a 50-ton capacity.



GENERAL VIEW OF THE PORT OF MONTEVIDEO, URUGUAY.

Upper: A section of the city, showing in the distance the arrangement of breakwaters and some of the new warehouses near which ships are docked. Lower: Another and closer view of a part of the harbor used by Uruguay's naval vessels. On the extreme left may be seen one of the fine river steamers that ply between Montevideo and Buenos Aires.

A NEAR VIEW OF DOCK "A," MONTEVIDEO, URUGUAY.

This picture, which was made from the headquarters of the captain of the port, shows a portion of the completed improvements and the cranes for handling cargo. Many import and export products are stored within the warehouses and along the piers.

To defray a portion of expenses of port improvements Uruguay levied what is termed a "patente," or tax, of 3 per cent on imports and 1 per cent on exports of Montevideo. In a 10-year period these taxes amounted to more than $12,000,000, or in excess of $1,000,000 a year.

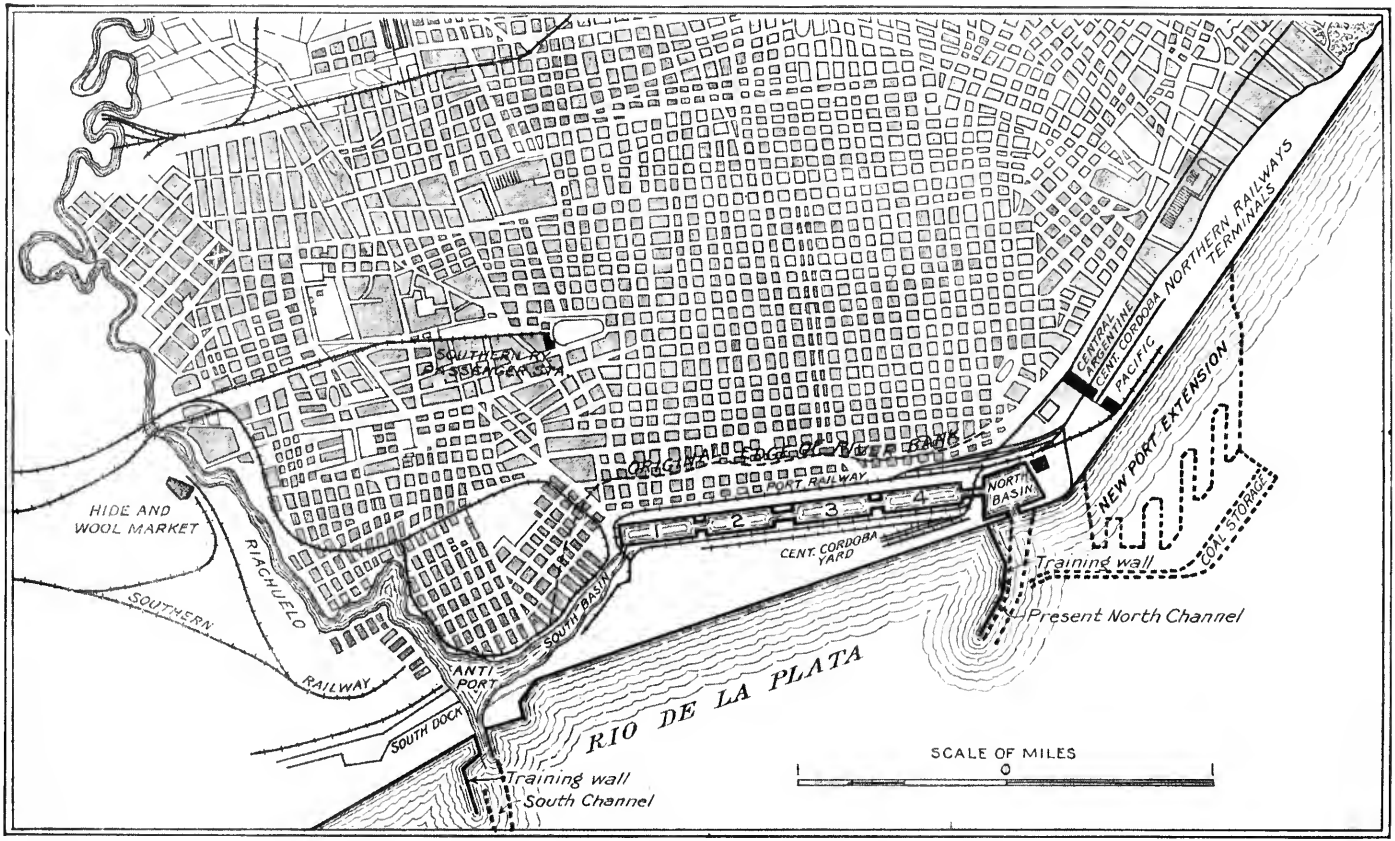
Montevideo has not only improved harbor and docking facilities but has devoted a large sum of money to building lighthouses, installation of submarine bells, harbor buoys, wireless telegraph, etc. The Cerro, or hill, which is said to have been a point for which Magellan steered his little fleet centuries ago, now serves as a signal and wireless station. It dominates the city and surrounding country for miles, and most visitors consider the historic hill a place of special interest and worthy of a visit on a drive about the city.

Not all of the waterfront of Montevideo has been turned over to trade and traffic. Indeed, sections of the long sandy beaches have been made into playgrounds for the people, and it is there we find many amusement features of the modern pleasure resort and, during the days of summer, a vast throng of citizens enjoying the sea bathing and the delightful casinos and hotels for which Montevideo is famous.

The Rio de la Plata (river of silver), so named by Sebastian Cabot, who, according to fragmentary history, observed natives of the region wearing crude ornaments made of silver, is really an arm of the sea extending 150 miles inland. The river is 120 miles wide at its mouth and at the confluence of the Uruguay and the Parana this great width has decreased to about 4 miles. Unfortunately the Plata is comparatively shallow, and for this reason a vast amount of dredging has been necessary in order to deepen the channels for the larger ocean vessels of today.

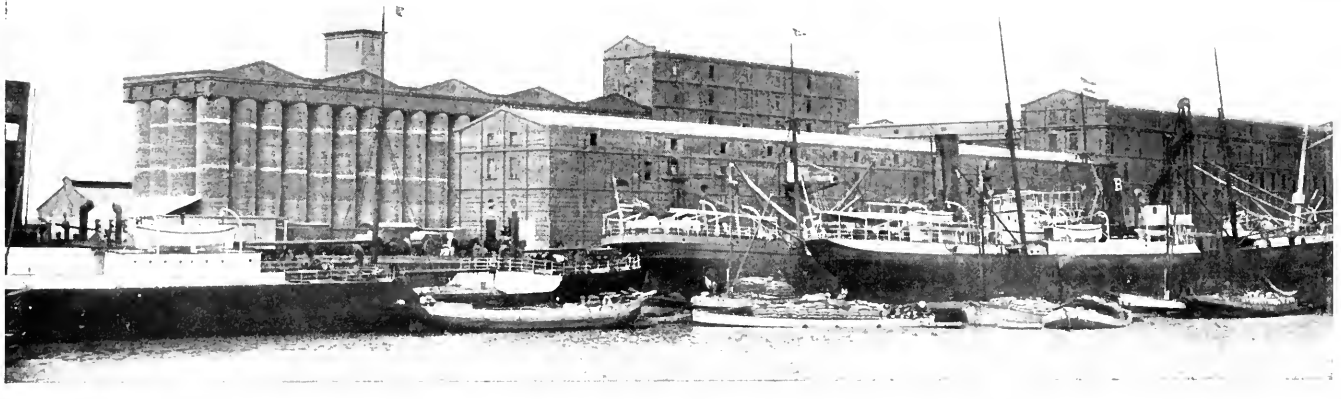
Buenos Aires is about 130 miles from the ocean, and this great port officially includes La Plata, a smaller but growing shipping center 40 miles nearer the sea. For 20 miles or more below Buenos Aires the river has been dredged, and today a channel admitting the largest ships (at most seasons) is in use. The rapidly growing trade, however, caused a new impetus to port facilities, and in 1911 a contract for improvements was made calling for an outlay of more than $24,000,000 gold. A short time thereafter these gigantic plans were started and have progressed with gratifying results, although it may be several years before the whole system can be finished and put into operation.

From the main channel up the Plata there are shorter channels leading to two extensive basins within which are included more than 600,000 square meters. There are a great number of warehouses, many of which are the property of the Government, while others are privately owned. To operate the gigantic cranes, hydraulic power is



GENERAL VIEW OF THE PORT OF BUENOS AIRES, ARGENTINA.

The dark lines indicate present facilities for handling shipping. Broken lines on extreme right show proposed port extension to meet growing needs. Immediately in rear of these proposed docks several Argentine railways have erected their depots. Along the Riachuelo River, on extreme left, additional docking facilities are available. The great hide and wool market, fronting this river, is also connected with the interior by rail.



OTHER VIEWS OF THE GRAIN WHARVES AT BUENOS AIRES, ARGENTINA.

In the two pictures we have both distant and near glimpses of trade and traffic. Notwithstanding the enormous facilities, it frequently happens that two or three ships must dock at the same pier and load cargo directly and also from the lighters, shown in the lower picture.

used, and in a single case, which is fairly illustrative of many others, 10,000 tons of grain may be handled in a 10-hour day. This warehouse company has a capacity for storing 120,000 tons of wheat, and attached thereto is a mill with a daily output of 4,000 bags of flour. For miles along the water fronts of the two basins already mentioned and on both sides of the Riachuelo, a tributary of the Plata which serves as a part of the Buenos Aires port, one may see at all times an array of steam and sailing ships from all parts of the world. In a recent year the vessels that cleared the port numbered 2,588 carrying away 60 per cent of the entire foreign trade of the country.

Reviewing the actual work already accomplished on the extensive improvements, it was shown officially that certificates of work for $5,561,528 gold had been approved. New quays will cover more than 100 acres and be served by 30 or more miles of dock railroads.

Argentina's most important southern outlet is Bahia Blanca, 500 miles south of Buenos Aires, on the great bay of the same name. The trade of the port in recent years has gone forward by leaps and bounds, a condition largely influenced by the enterprise of the railways centering there and which spread fanlike to interior regions of the country. In 35 years Bahia Blanca has grown from 2,000 to 50,000 population and millions of dollars have been spent on the ports, known as Ingeniero White and Galvan. In the year 1912, these two ports reached their greatest activity, and the exports of grain amounted to 1,759,200 metric tons, while the shipment of wool showed a total of 93,800 metric tons. More than 400 steamships participated in this trade during the same year.

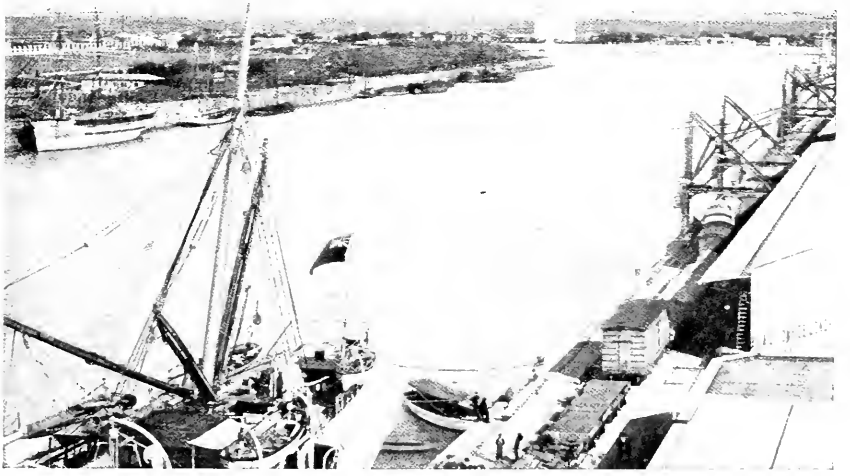
At Ingeniero White the first steel mole constructed has a quayage of more than 3,000 feet and can berth at least 10 vessels at the same time, the water depth being from 25 to 30 feet. A wooden mole with space of 754 feet was specially constructed for handling large volumes of grain in the shortest space of time, a necessity during the busy season. This mole and the electrically driven machinery make it possible to embark 10,000 tons of grain in a single day. A number of other moles act as auxiliary facilities, and all of these are equipped with the most modern machinery known to ports and harbors in any land.

Galvan, unit of the larger port, is located on land reclaimed from river swamp. This is also modern in design and equipment and has accommodation for at least 12 large vessels at long quays constructed of masonry; these quays are served by 30 railway tracks onto which trains loaded with grain are run as they come from the interior. Additional traffic facilities are under construction.

Among the interesting features of the port of Bahia Blanca are the giant grain elevators which pour forth their valuable product directly into the ship's hold as the vessel lies alongside the pier. Two of these

THE RIACHUELO, BUENOS AIRES.

The Riachuelo, a tributary of the Plata, serves as a part of the Buenos Aires port.



LA PLATA, ARGENTINA.

A part of the port of La Plata, showing the deep-water canal and facilities on either side for handling cargo. Ocean vessels draw up alongside the great meat-packing plant located there and load foods directly from cold-storage warehouses.

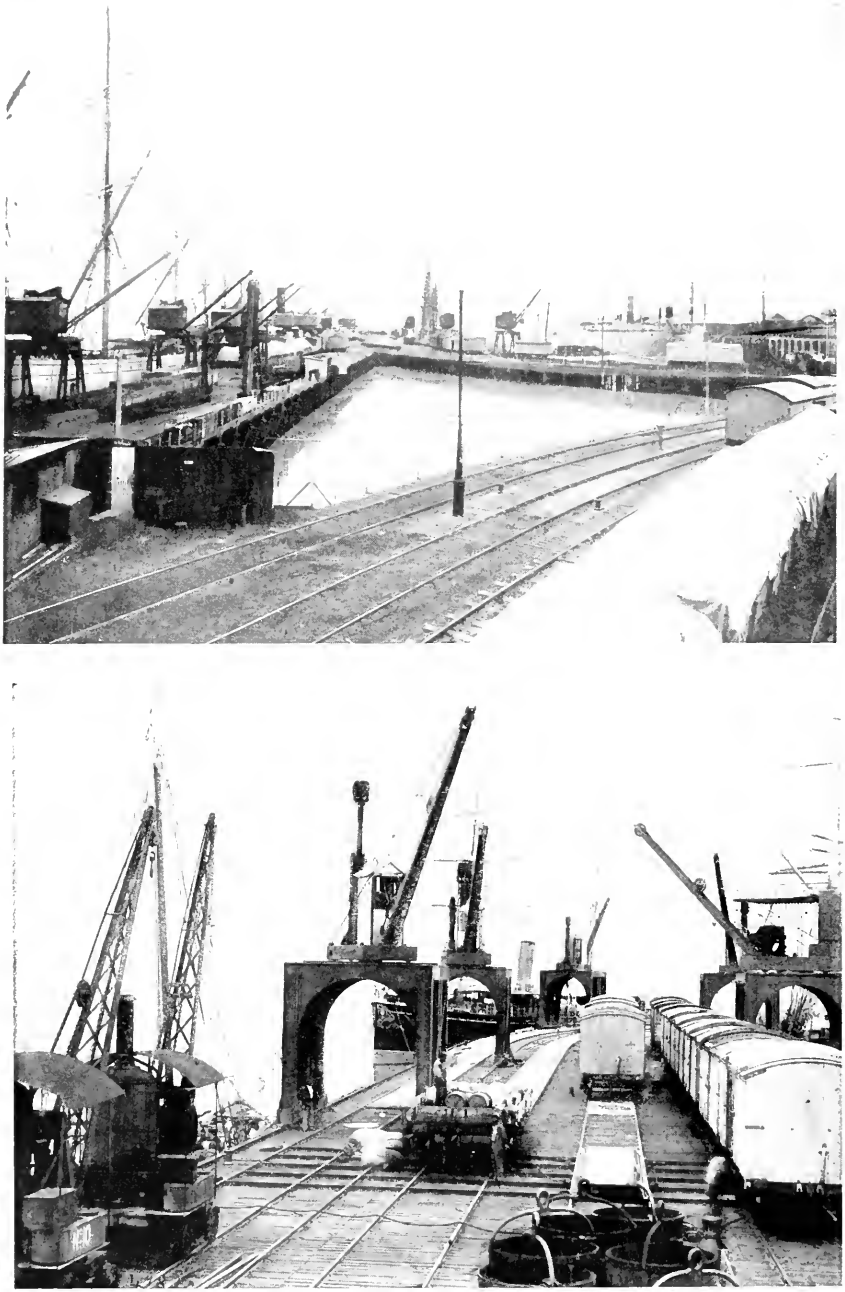


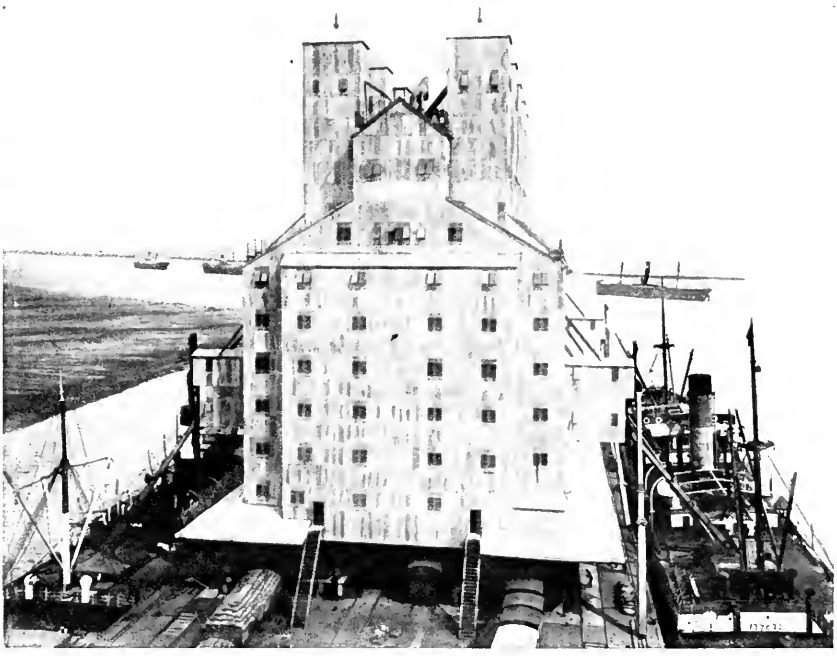
Photo by Underwood & Underwood.

TRAFFIC FACILITIES AT BAHIA BLANCA, ARGENTINA.

Upper: This view of a portion of the harbor facilities at Ingeniero White shows the plans adopted for saving time and labor. The many tracks in the foreground are on the mainland. Lower: A part of the docks of the Southern Railway. This road penetrates Argentina's southern wheat belt and its trains run directly onto the docks and are unloaded mechanically.

immense buildings each have a capacity for storing 26,000 tons of cereals; and into each building cars bearing 45 tons of grain are run and quickly mechanically unloaded. A 5,000-ton ship may be fully loaded in from 6 to 8 hours.

A few miles from Bahia Blanca is Argentina's southern naval base, at which there are usually stationed a number of war vessels. A dry dock was recently finished which receives the giant sea fighters, *Rivadavia* and *Morena*, each of 28,000 tons displacement. As this dock is now the largest in South America it may be of interest to note some of its dimensions. First, the contract for the structure was let in 1911 and three years thereafter the excavations and preliminaries were completed. The total cost has been more than $6,500,000, not including half a million additional for the latest machinery with which the dock is equipped. It is 600 feet long, 32 feet wide at base, 120 feet wide at top. Five pumps are used to discharge the water, and when all are working it requires only $1\frac{1}{4}$ hours to empty the dock. Engineers Huergo and Gigliaza and Capt. Maurette, of the Argentine Navy, designed and constructed this great work. The basin on which the dock is located has been dredged to 33 feet, a channel sufficiently deep to admit the larger vessels of the present time.



ONE OF THE GIANT GRAIN ELEVATORS AT BAHIA BLANCA.

Loaded trains from the interior are quickly handled, the grain passing into the elevator for the cleaning process before entrance into the many chutes leading to the ship's hold.

THE CITY OF CONCEPCION, CHILE.

"Concepcion Bay is Chile's southern naval base, and on this bay lies Talcahuano, a city of nearly 50,000 people. Nine miles inland, and connected with the port by both steam and electric railways, is the southern metropolis of Chile, Concepcion, with approximately double the population of the port." The bridge shown in the above picture crosses the Bio-Bio River, and is over a mile in length.

WEST AND NORTH COASTS

Along the west coast of South America the productive regions do not as a rule, send forth their products to a few trade centers, but to many small shipping points. Chile alone is credited with more than 60 ports; Peru, Ecuador, and Colombia have many more. Consequently, there are not many ports comparable in size and expenditure to those of the opposite side of the continent.

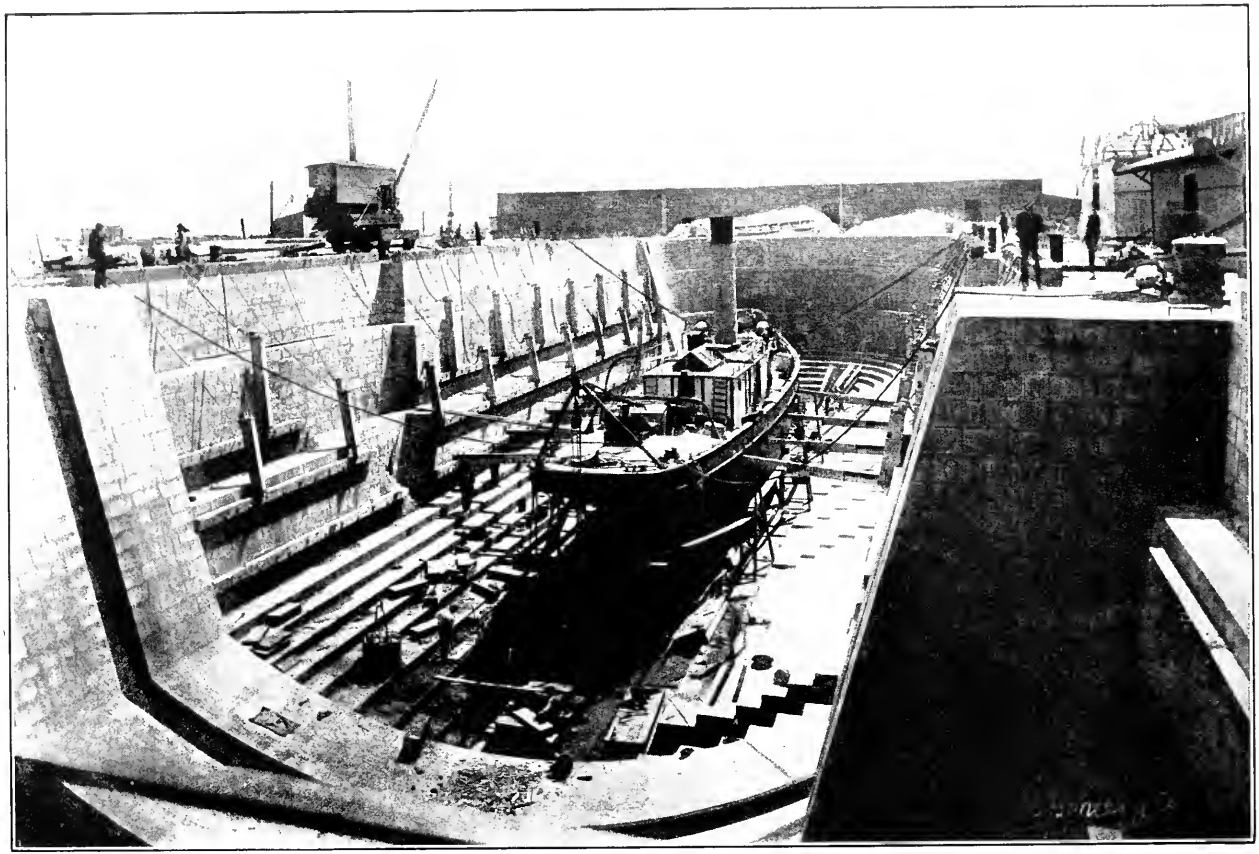
Concepcion Bay is Chile's southern naval rendezvous, and on this bay lies Talcahuano, a city of nearly 50,000 people. Nine miles inland, and connected with the port by both steam and electric railways, is the southern metropolis of Chile, Concepcion, with nearly double the population of the port. Talcahuano, Lota, and Coronel, not far distant from each other, form a cluster of leading smaller ports, their importance being based largely on the fact that in this region lie the Chilean coal mines which supply fuel to many naval and merchant vessels.

Talcahuano has a good anchorage in 36 feet of water half a mile from shore. Steamers discharge and load cargo at the rate of 600 to 800 tons per day. The Government crane has a capacity for handling goods up to 40 tons. There is a dock for repairing naval and commercial vessels. During recent years large sums of money have been spent in dredging and in the construction of long quay walls, all of which will doubtless be continued on a more extensive scale as funds become available.

Modernizing and improving the port of Valparaiso is perhaps the most spectacular task confronting the engineer in any South American harbor. The large bay is semicircular in form and opens toward the north—the latter fact placing the ship at anchor in the bay at a disadvantage during the months of July, August and September, when storms frequently cause damage. Valparaiso Bay strikingly contrasts with the conditions prevailing at Montevideo and Buenos Aires; the former being extremely deep and necessitating vast expenditures in breakwater construction, while, as has already been shown, the two Atlantic coast cities suffer the handicap of shallow water harbors.

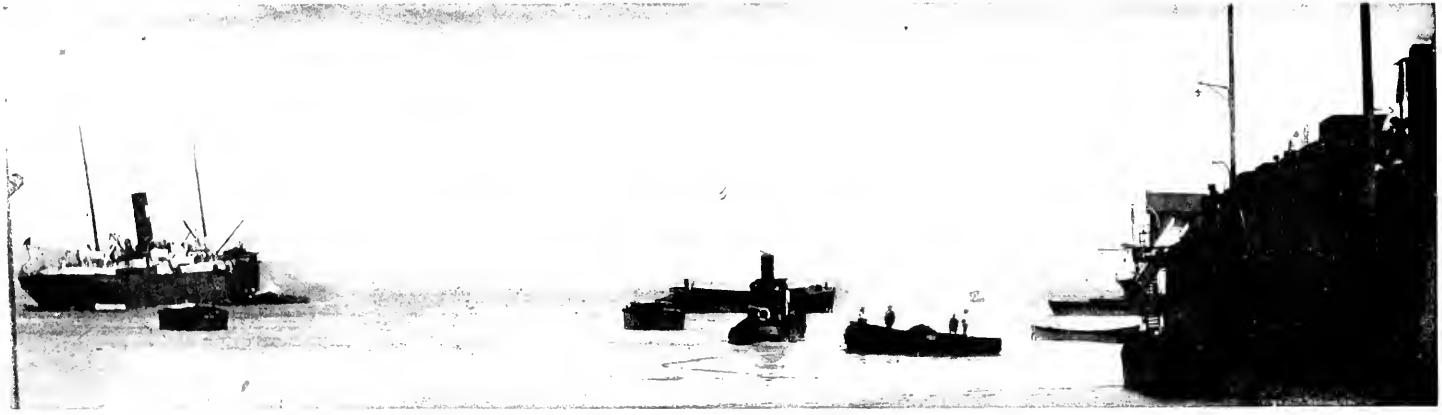
At Valparaiso the engineers concluded to build gigantic hollow cubes of concrete, of 50 feet dimensions, on shore and then float them to position. In February, 1917, the first of these cubes was laid, the occasion being marked by appropriate ceremonies. Scores of citizens were "aboard" this first giant cube, over which waved Chilean flags, as it was towed to its position in the breakwater line. Stone was placed inside, and as the weight increased the cube finally sank.

The improvements at Valparaiso began on a large scale in 1912, an English company having secured the contract, which involved



SECTION OF THE DRY DOCKS, TALCAHUANO, CHILE.

The large dry docks at the flourishing maritime port of Talcahuano were constructed under the direction of the Federal Government at a cost of about $6,200,000 gold. They are located a short distance from the great coal-mining district of Concepcion. Talcahuano is the naval station of the Republic.



CORONEL, CHILE.

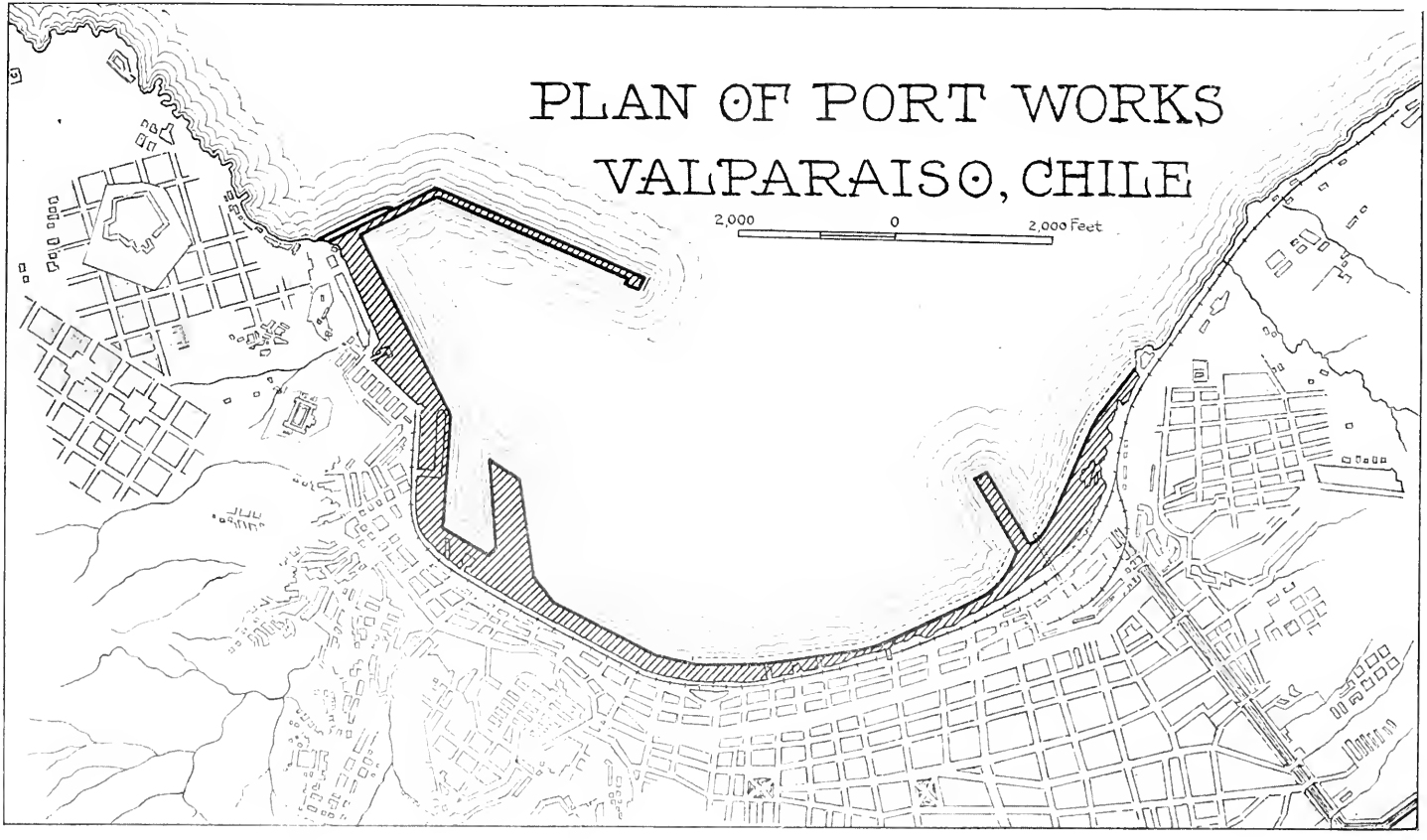
Two views of the method of handling cargo. This region of Chile supplies shipping with large quantities of coal. Trains from the mines are run onto the long pier and loading into lighters is done from either side.

$12,000,000. A space covering 220 acres will be made safe for ships at all seasons. A few of the main features mentioned in the contract are a breakwater about 1,000 feet long, a quay wall 2,000 feet in length, extension and improvement of the fiscal wharf to a length of more than 1,000 feet, a jetty 820 feet long and 328 feet wide with landing quays on both sides, a vast amount of filling in behind quay walls on which eventually will stand many more warehouses.

Much of the work at Valparaiso has been done and still more remains to be accomplished. In the original agreement the contractors were to complete the works in seven years, or in 1917, but owing to the effect of the great war delays were experienced and more time will be necessary. If, however, we stand at the country's Naval Academy, on the heights overlooking the bay, some important features of the plan may be seen in almost their completed form. These are the large warehouses on the shore and the new quay walls which are in the form of the letter T with the top of the letter toward the bay. On the outside line the water is sufficiently deep for large ships; inside, on the stem of the so-called letter, smaller vessels may be moored. Dredging near the shore is in progress.

The new port of San Antonio, 40 miles south of Valparaiso, is progressing satisfactorily, and ships may draw alongside the long iron piers and discharge and load cargo. This new port is 47 miles nearer Santiago than is Valparaiso, and the object of its construction is to relieve the older port of the traffic congestion that often existed. Furthermore, the railway line is having its influence in developing the country between Santiago and San Antonio, and as the port works draw to completion doubtless the importance of the new outlet will be especially marked.

The activity of capital and the consequent outflow of iron ores from the Tofo mines, near Cruz Grande, 130 miles north of Valparaiso, appears to be responsible for the construction of what are perhaps the most unusual docking facilities along the entire coast. French capitalists owned the mining properties, which were acquired a few years ago by North American interests. A new railroad from the port to the mines, 15 miles inland, was built; and in descending the grade to the port electric engines generate at least a part of the power required to pull the empty cars back to the mines. The former French operators could load only 1,000 tons of ore per hour, which was far too small an amount to satisfy the new company. A gigantic dock, therefore, was planned and constructed. This dock is cut out of the precipitous coast; and its bottom level is about 40 feet below the waters of the Pacific. Reinforced concrete was extensively used in its construction. Ships are able to enter this dock and receive more than 15,000 tons of ore per hour—a vast amount in comparison with the average rate of


PLAN OF PORT WORKS
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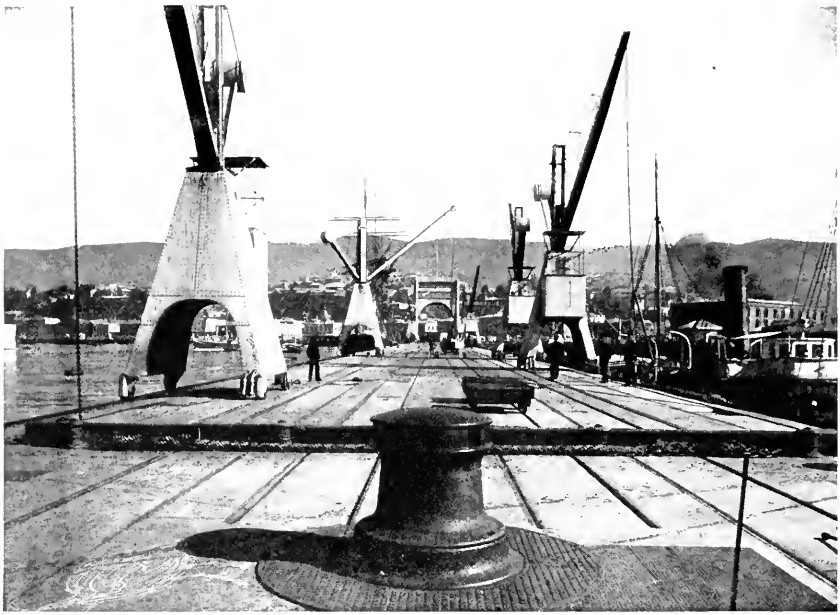
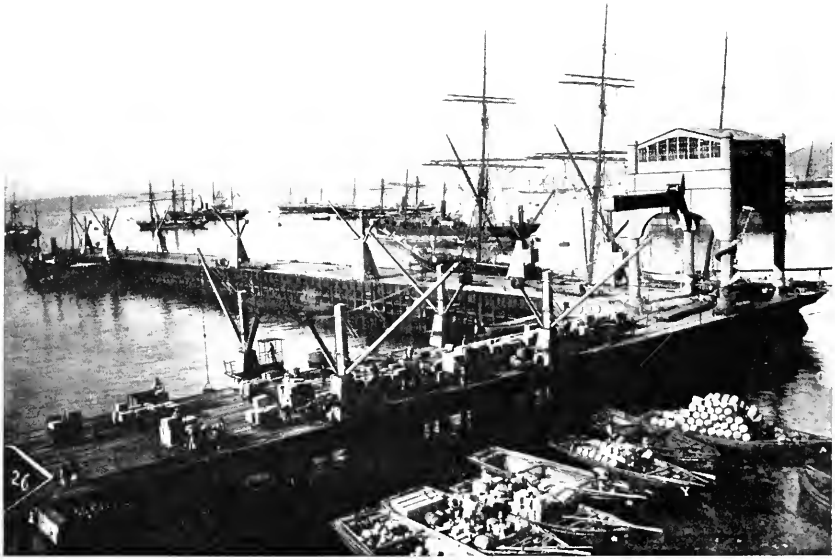




VALPARAISO, CHILE.

Upper: Several of the new gigantic cranes for handling cargo. Lower: A view of portions of the completed docks.

loading along the coast. Railroad trestles along the sides and high above the dock are so built that trains from the mines discharge the ore directly from car to ship, thus saving the tedious service of lightering cargo. It is said that the company will operate its own ships, another feature of production and marketing that is possible only with enterprises having large capital.

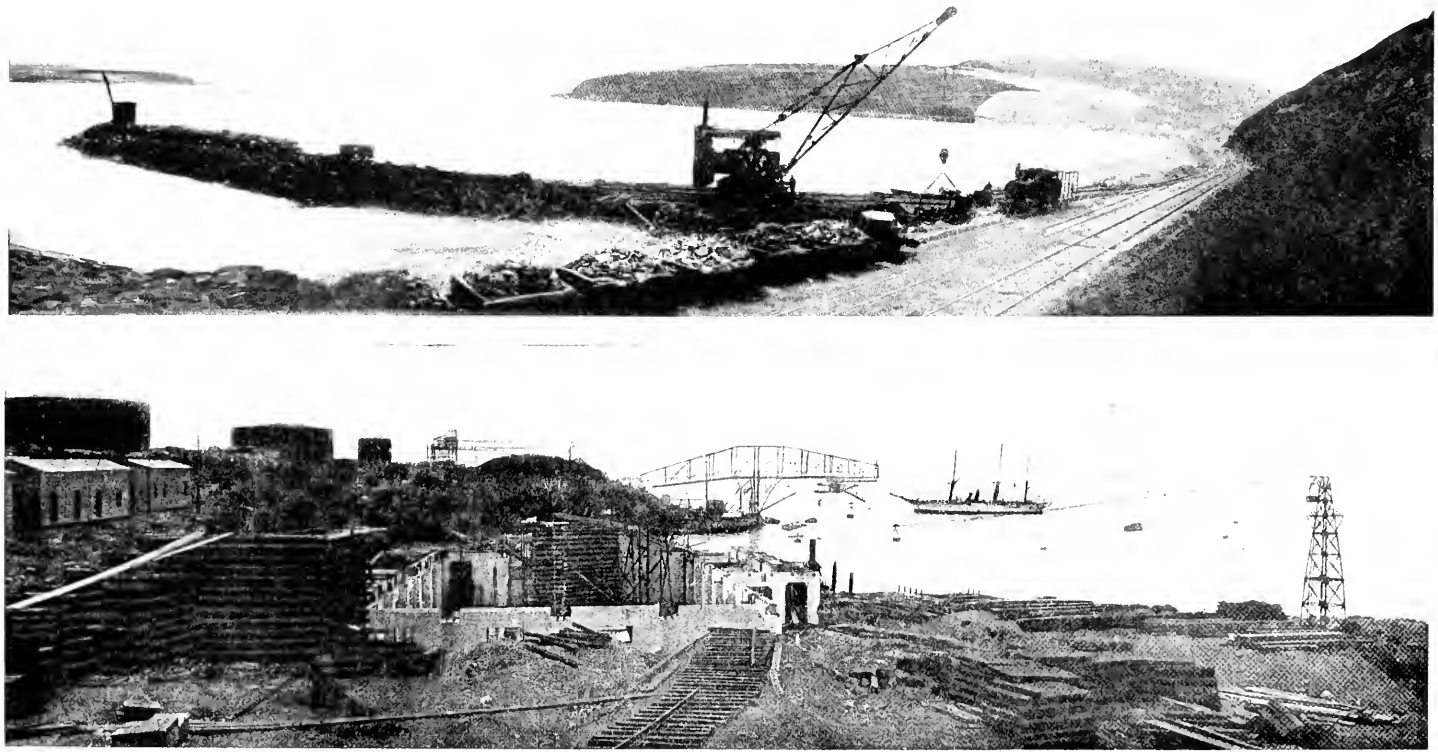
Antofagasta, 600 miles north of Valparaiso, is the third port of the country in commercial importance, and, unfortunately for the place, its port improvements have not kept pace with the general progress and upbuilding of the city. The latter has probably modernized more rapidly than any other Chilean city in a similar space of time, and these features include almost all phases of economic growth, such as newly paved streets, sidewalks, motor busses, sewerage, new buildings, etc. Antofagasta, like Sao Paulo in Brazil, is situated almost on the Tropic of Capricorn.

The lack of shipping facilities is seriously felt, and plans are on foot for securing a foreign loan in order to construct adequate improvements. A large area of reefs fronting the city will be used for reclamation purposes, a breakwater will be constructed, and extensive quays provided. The cost of these improvements is estimated at something more than $8,000,000, and if a loan is raised the interest rate will be 6 per cent and the amortization about 2 per cent.

Iquique, claiming a population of 30,000, lies 830 miles north of Valparaiso and is the country's second port of commercial importance. Its exports are approximately double those of Valparaiso and are mainly the well-known nitrate and other mineral products. In imports, however, Iquique falls behind Valparaiso. Like the larger city, Iquique has planned extensive port improvements, and no doubt the present prosperity of the country will give renewed impetus to these proposed facilities.

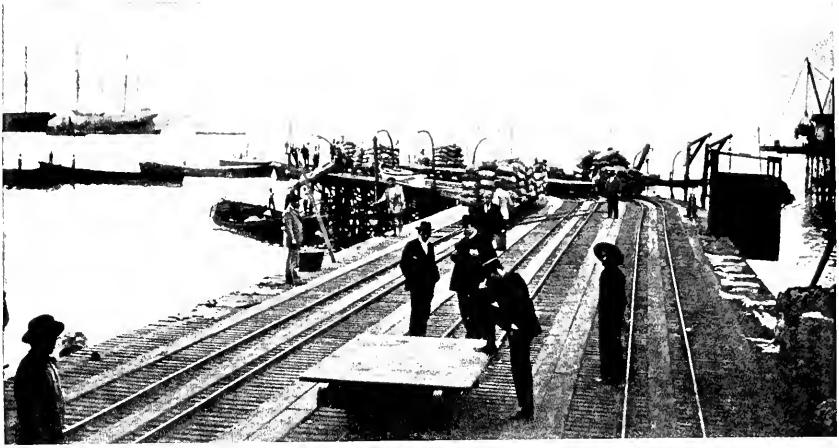
Peru has a dozen or more larger ports on the Pacific, of which Mollendo and Callao are the most important. From all of her ports, Amazon and Pacific, Peru shipped in a recent year more than $130,000,000 worth of raw products and purchased abroad $58,389,986 in return, or conducted a foreign trade of more than $189,000,000. A large portion of this commerce was doubly handled—that is, from pier to lighter and from lighter to ship and vice versa.

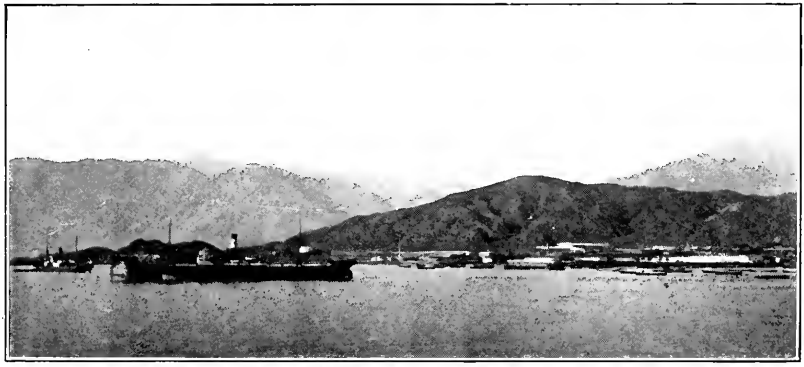
Mollendo is the important southern port of Peru and the starting point of the railway between the Pacific and Lake Titicaca and other inland regions. The surf and sea swell at this port are heavy, especially during June, July, October and November. Ships anchor a mile or more out in the roadstead, and everything must be transported ashore by smaller craft. An island near the shore has been utilized as a sea buffer, and all boats direct their courses accordingly

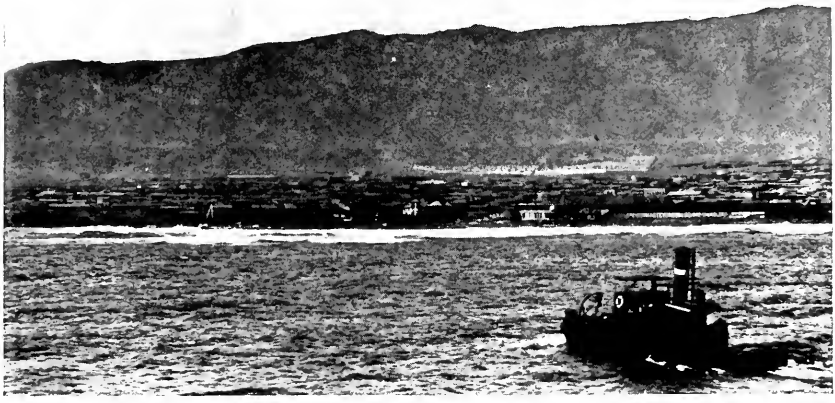


TWO CHILEAN PORTS.

Top: View of the new port of San Antonio, 40 miles south of Valparaiso, on which work is nearing completion. This port is 47 miles nearer Santiago, the capital, and metropolis of the country, than is Valparaiso, and is destined to relieve the congestion of traffic at the latter port. Bottom: The port of Cruz Grande, the outlet of the Tofo iron mines of the Bethlehem Steel Company, near Coquimbo, Chile. The old French cantilever ore loader is shown extending out over the water. This cantilever loader now has a capacity of 1,000 tons of iron ore an hour, while the new loading docks, cut out of the solid rock, have a loading capacity of 16,000 tons an hour.







THREE IMPORTANT CHILEAN PORTS.

Top: Iquique, showing pier extending out into the harbor where the lighters are loaded and unloaded. Iquique is Chile's second port in commercial importance, being chief nitrate port of the country. It is located about 830 miles north of Valparaiso and has a population of about 30,000. Center: A section of Taltal harbor, Province of Antofagasta. Bottom: Antofagasta, the third most important port of Chile, is situated about 600 miles north of Valparaiso, almost on the tropic of Capricorn, and is in the nitrate region. Extensive port improvements, to cost about $8,000,000, have been planned and will soon be started.

and unload passengers and freight behind the island in somewhat protected waters. Considerable improvements in recent years in sea walls, and a number of steam cranes having a capacity up to 20 tons, make the loading and unloading of cargo much more expeditious than formerly. Northward 480 miles is Callao.

Callao is the only Peruvian port where modern docking facilities have been completed, although several other places have such improvements in contemplation. At other ports the long iron pier is used in handling cargo which arrives on the pier in trains directly from the interior.

At Callao, although the docks are extensive, they have been found at times inadequate, and additions are proposed. A few years ago Dutch engineers, at the request of the Peruvian Government, investigated the possibilities of port improvements, one feature of which was the joining of a near-by island and the mainland at La Punta, with modern docks and piers between the two points.

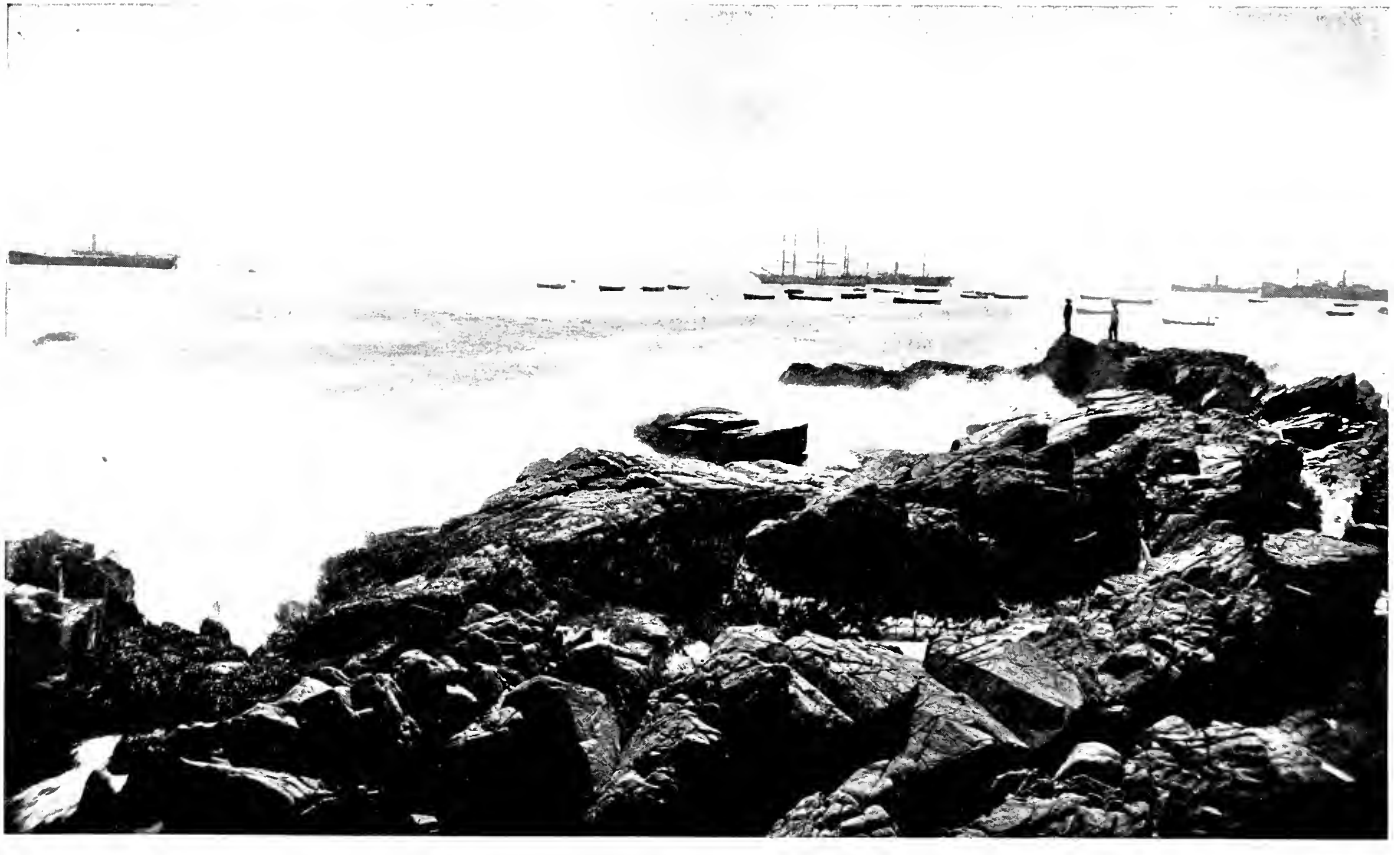
For many years prior to 1912 a French company held exclusive control of the loading and the unloading of vessels within the port, and certain privileges are still retained by this company. One striking feature in connection with Callao's shipping is the arrival of a larger number of steamships bearing the flag of the United States. Formerly it was customary for from 30 to 40 United States sailing vessels to call at Callao, bearing lumber cargoes, but the presence at different times of an increased number of steamships causes comment, as well as the unloading of greater quantities of manufactured products from the United States.

Callao is credited with 35,000 population, and in recent years perhaps nothing has been more important for the city than the new sewerage system completed in 1913.

Passing northward from Callao there are several ports before reaching Paita, the most northern (of importance) and one of the best ports on the entire coast of Peru. Being located within the rapidly-developing petroleum region, Paita is destined to grow and no doubt will soon find it necessary to give more attention to improving shipping facilities. Here the traveler usually procures a fine Panama hat or two from native merchants, who surround the steamship as she lies at anchor far out in the bay. A long iron pier from the shore aids traffic.

Northward, 215 miles from Paita, the ship enters the harbor of Guayaquil, Ecuador's chief commercial city. The 70-mile sail up the Guayas River from the ocean, especially if the vessel has proceeded from the rainless coast of Chile and Peru, offers delightful contrasts in beautiful tropical foliage and picturesque surroundings. The depth of the river admits vessels drawing 22 feet of water.

The "marina" or quay wall has been constructed along the shore of



THE ROCK-BOUND COAST AT MOLLENDO, PERU.

The ocean steamship usually anchors a mile or two offshore and passengers and freight are landed by means of the steam launch and the lighter. On the right of the picture the small bay extends inland to the landing piers. A short distance south of the rocky headland shown in the picture there is a fine sandy bathing beach, which is always popular.

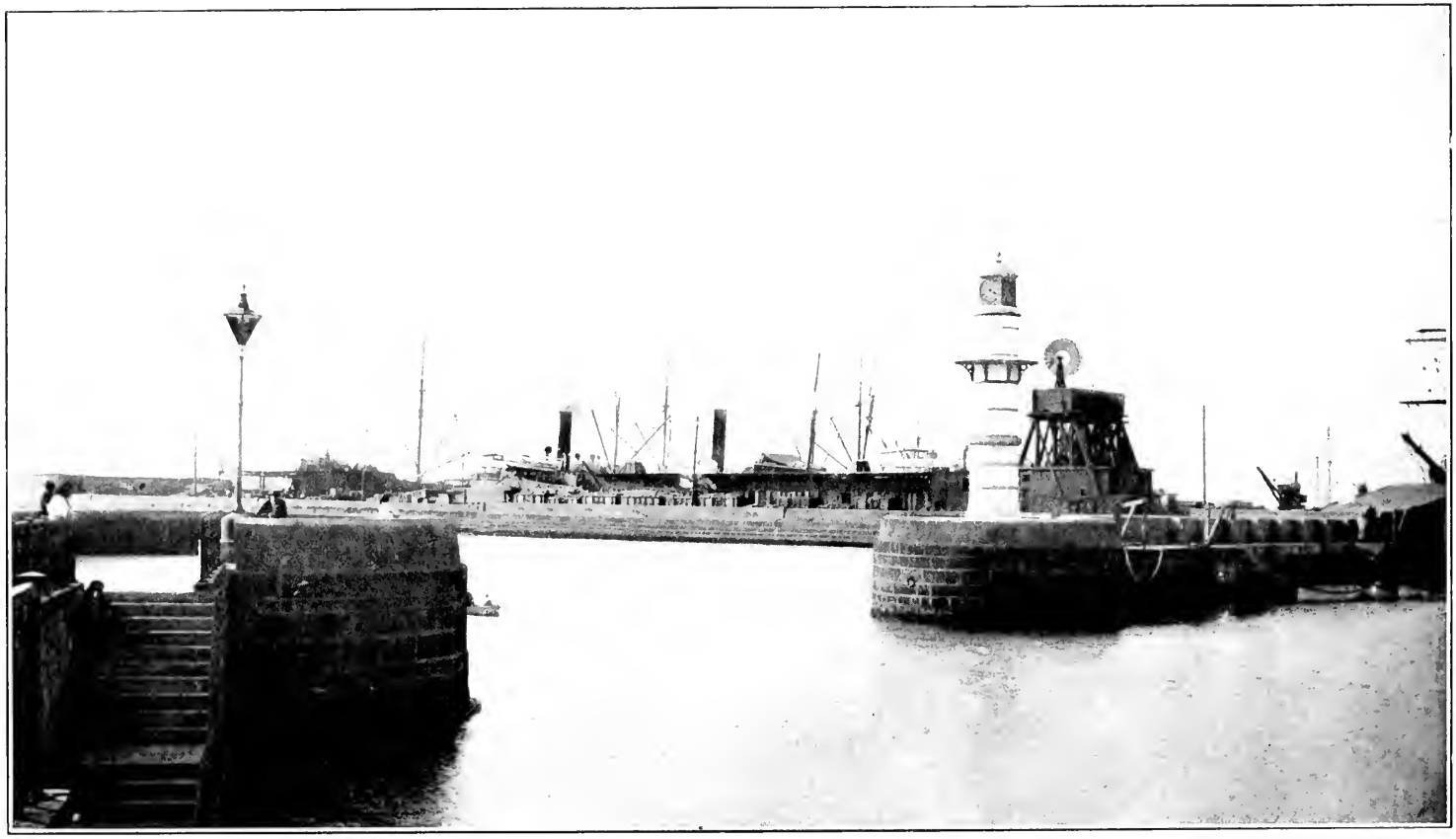
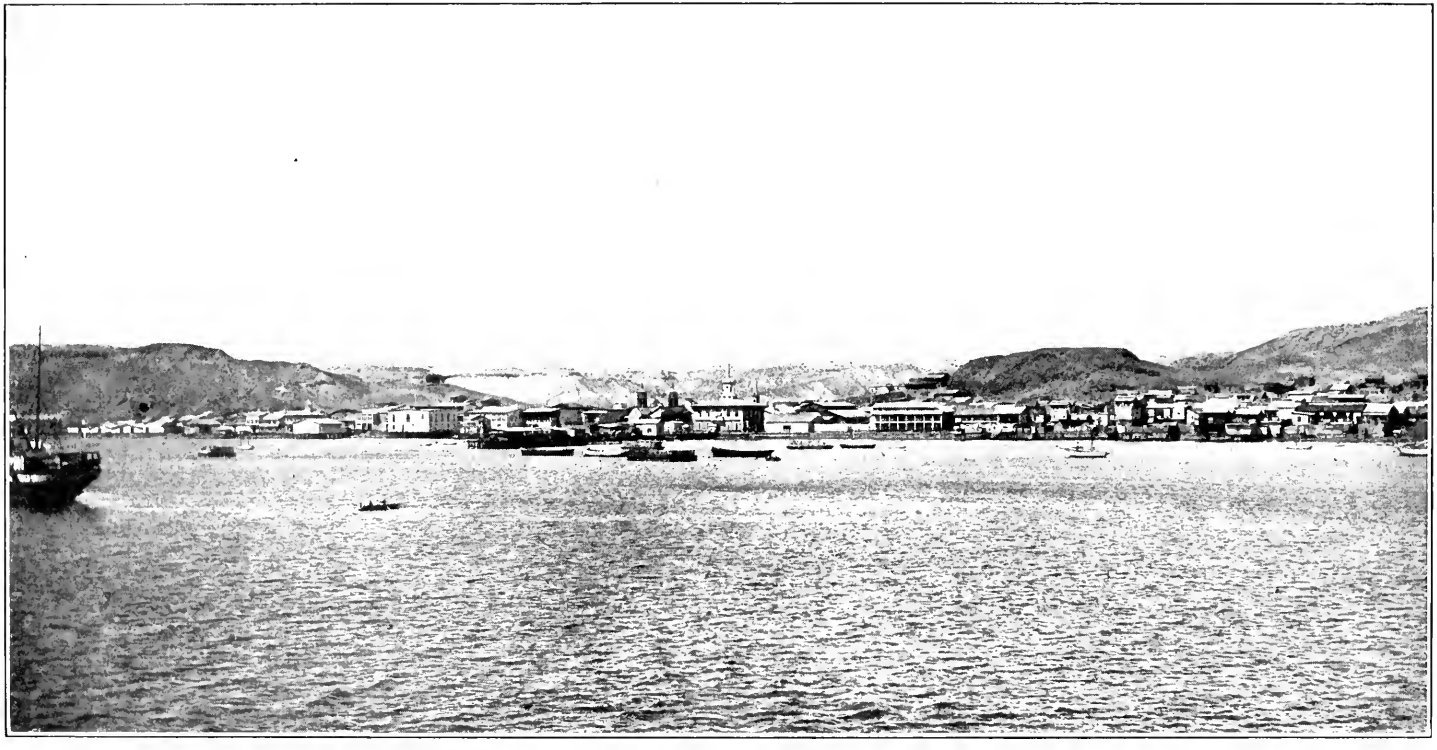


Photo by W. V. Alford.

THE PORT OF CALLAO, PERU.

Callao is the only Peruvian port where modern docking facilities have been completed, although at several other places such improvements are under way. Although these docks are quite extensive, they have been at times inadequate to accommodate the growing commerce of the city and extensive additions are being considered.



VIEW OF PAITA, A PORT OF NORTHERN PERU.

Paita, the most northern of Peru's ports, is one of the best on the Peruvian coast. It is located within the rapidly developing petroleum region of the country, and the increased activities in this industry alone will necessitate further port improvements. At present a long iron pier which extends out into the harbor offers facilities for loading and unloading cargo.

the river for a considerable distance and is capped with stone. Extending backward is a broad area along which a large maritime traffic is received and dispatched. The port proper is about 3 miles long and from a half to a mile broad, with a depth of water of from 12 to 40 feet. Several rivers, such as Daule, Bahahoyo, etc., unite with the Guayas above Guayaquil, and the tide in these rivers is felt from 50 to 80 miles inland. The rivers, especially during the rainy season, provide fluvial arteries for steamers of considerable size for many miles, in some cases to Zapotal, 200 miles distant.

The harbor of Guayaquil delights the average traveler with its number of small sailing vessels, many of which have the appearance of oriental form and life and which transport to Guayaquil a vast quantity of natural products gathered by natives in tropical forests along the streams mentioned. The large ship anchors off the port and lighters transfer the products between vessel and shore and at the rate of about 8 tons per hour from each hatch of a ship.

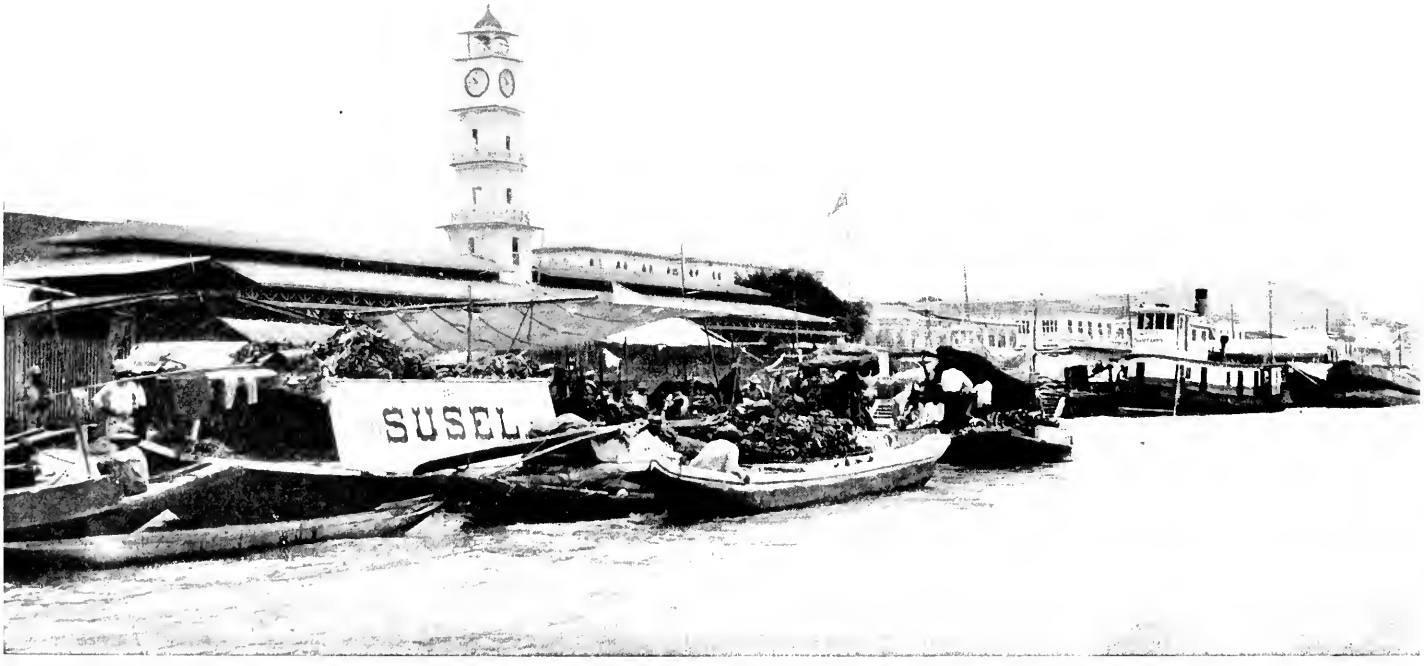
Recent years have seen marked improvements in Guayaquil's preparedness for handling a larger amount of foreign trade. Not the least important are the sanitary improvements and other modernizing works in progress in and around the city.

Quite a number of small sailing vessels are constructed in Ecuador's ports of Data, Morro, Posorja, etc., and it seems probable that the present demand for ocean transportation may have a stimulating effect on local work of this nature, which in recent years has somewhat declined, at least in the building of ocean-going craft.

The more northern ports of Ecuador are Manta, Bahia, and Esmeraldas. From each of these ports considerable quantities of raw products are shipped annually, but as yet it is necessary to load cargo by the old method of the small boat and lighter. At each of these towns railways have at least started backward into the country and the plans of their promoters are to carry them to the interior, eventually to Quito or even across the mountains into the Amazon region. With such new routes open to commerce it seems probable that the seaports must soon improve and modernize their facilities for handling greater business.

Passing from Ecuadorian waters northward the vessel goes on the bosom of the Peruvian current, the rate of the latter's movement being from 25 to 35 miles per day all the way to Panama, a distance of nearly 800 miles.

The most important Pacific port of Colombia is Buenaventura, at about the halfway point of her western coast. Since the completion of the railroad from this port to Cali, 80 miles inland, there has been considerable endeavor to build a modern port. One of the most essential features is the betterment of sanitary conditions which are



A VIEW OF GUAYAQUIL, THE CHIEF PORT OF ECUADOR.

Guayaquil is situated on the Guayas River, about 70 miles from the Pacific Ocean, the depth of the river admitting vessels drawing as much as 22 feet of water. The "Marina" or quay wall has been constructed along the shore of the river for a considerable distance, and is capped with stone, back of which is a broad area where maritime traffic is accommodated. The port proper is about 3 miles long and from a half to a mile wide. Large ships anchor off the port, and lighters transfer cargo at the rate of about 8 tons per hour from each hatch of the vessel.

TWO LEADING PORTS OF COLOMBIA.

Top: View of the steel pile pier of the Barranquilla Railway & Pier Co. (Ltd.), at Puerto Colombia, the actual seaport for Barranquilla. The pier is 4,000 feet long, extends into water having a depth of 26 feet, and will accommodate five ocean steamers at one time. Bottom: A section of the historic sea wall of Cartagena, Colombia, a landlocked port which is connected with the sea by means of a channel having a depth of 30 to 40 feet, sufficient to admit large ocean vessels. Although the port has been provided with extensive wharves for many years the growing traffic has necessitated the planning of improvements which will enable vessels to tie up to the railroad wharves and greatly facilitate the handling of cargo.

now under way by specialists engaged for the purpose, and at an early date no doubt Buenaventura will be as healthful as other parts of the country.

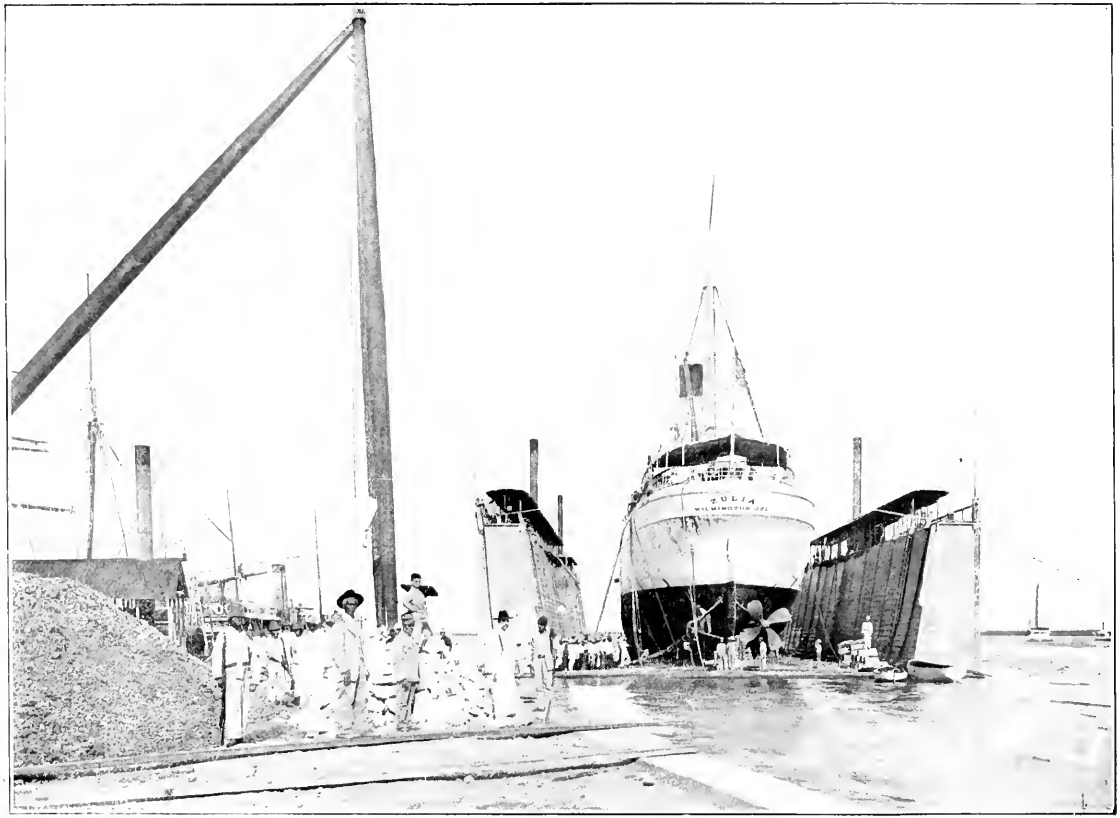
The population of the port is about 5,000, and the town is located 10 miles from the mouth of the river of the same name. The latter admits vessels drawing 25 feet of water as far as Buenaventura, and possesses many natural advantages favoring increased maritime trade. A Federal law recently passed provides for the Government's co-operation with the Pacific Railway Co. in order to secure a loan for harbor improvements and railway extensions.

Colombia and Venezuela were, by the opening of the Panama Canal, placed directly on the world's highway of maritime trade. With the return of normal conditions it is practically certain that these two nations, so wealthy in raw products needed in the great rebuilding era, will prosper as never before. The ports, therefore, have been the subject of much attention and some improvements.

Colombia's principal Caribbean ports are Cartagena and Barranquilla, the former on the sea and the latter a short distance up the Magdalena River. The course into Cartagena harbor (the city being on an island) lies along shores bedecked with mangroves, palms, and other tropical growth, with here and there a picturesque cluster of houses. In the background on the mainland rise a series of hills, and in numerous cases the prosperous business man has chosen the locality for his suburban residence.

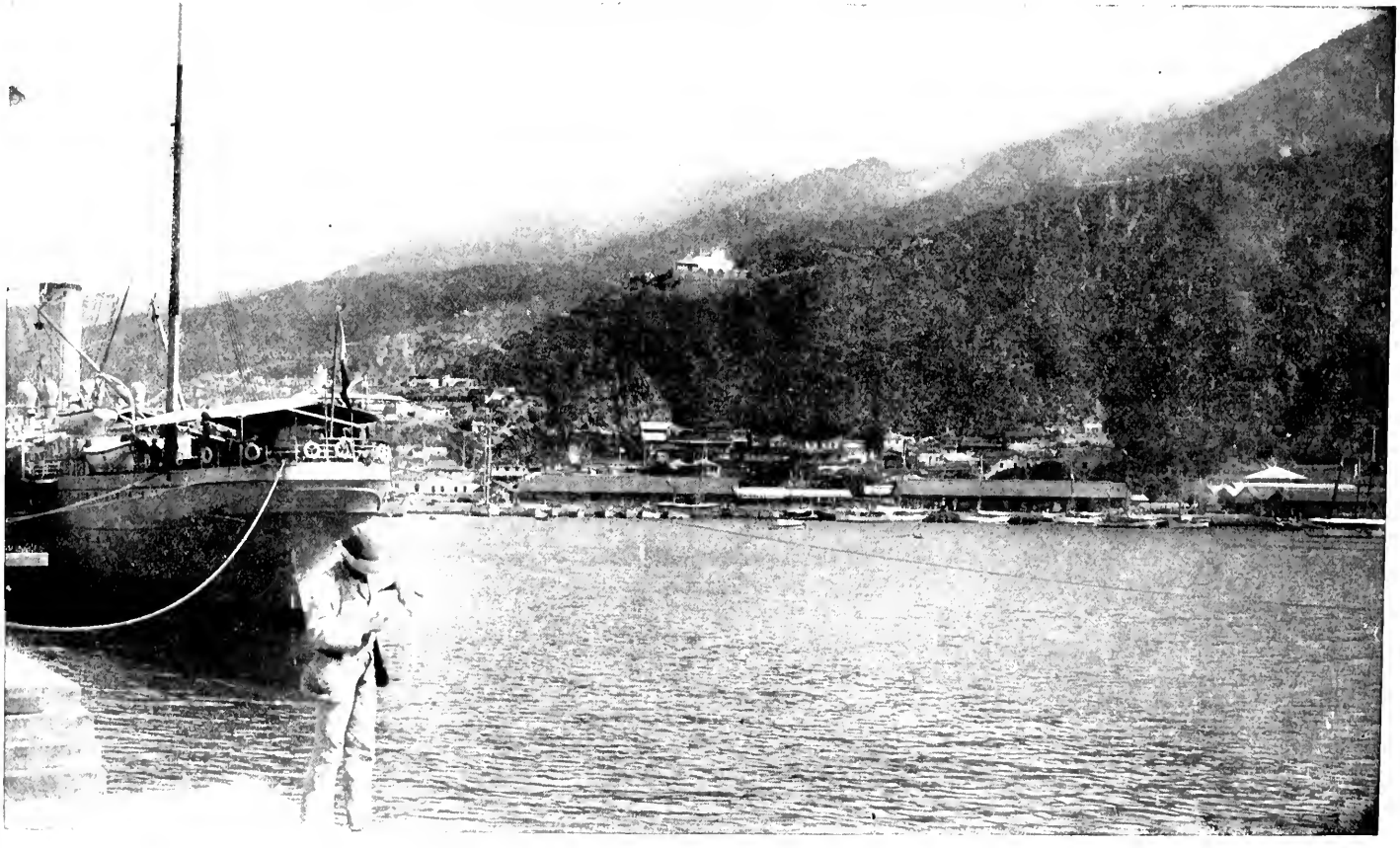
The port of Cartagena is landlocked and the channel leading thither varies from 30 to 40 feet, or is sufficient for the larger ocean vessels. Twenty-four years ago extensive wharves were constructed, but the growing trade demanded better facilities for handling cargo. The Government, through a well-known English firm, has plans for improving the city of Cartagena, as well as the waterfront, on a more extensive scale than ever before; the channel entrance is to be changed and deepened to the railway wharf, onto which run the trains from the Magdalena port of Calamar, 64 miles away. Passengers and considerable cargo are landed at Cartagena directly on the pier. The city has about 30,000 people and the most interesting feature is the great sea wall constructed around the city many years ago by the Spaniards at an outlay of millions of dollars.

Unfortunately for Colombia, the port of Barranquilla is not reached by the ocean steamship on account of sand bars obstructing the mouth of the Magdalena. In order to remedy this natural defect the Government has had engineers make a study of the possibility of dredging a canal or of deepening the river so that large ships could go directly to the port of Barranquilla. As it is today, the smaller ocean port, Puerto Colombia, receives the large cargo vessels and a railroad about



THE FLOATING DRY DOCK AT PUERTO CABELLO, VENEZUELA.

One of the best and safest harbors of Venezuela is that at Puerto Cabello, where large vessels may dock at modern piers and load and unload cargo directly from ship to wharf. One of the important adjuncts of the port is the floating dry dock which can accommodate vessels of 2,000 tons. Its dimensions are 282 feet long, 80 feet wide, and a height of walls above pontoon of 21 feet.



LA GUAIRA, THE PRINCIPAL PORT OF VENEZUELA.

Being near Caracas, La Guaira has become the principal port of Venezuela. Ships of the transatlantic lines which ply along the northern coast of South America call there, and the coastwise trade is active. It has a breakwater to which transatlantic liners of large draught may be warped, and is provided with all the facilities for handling cargoes as well as with large warehouses.

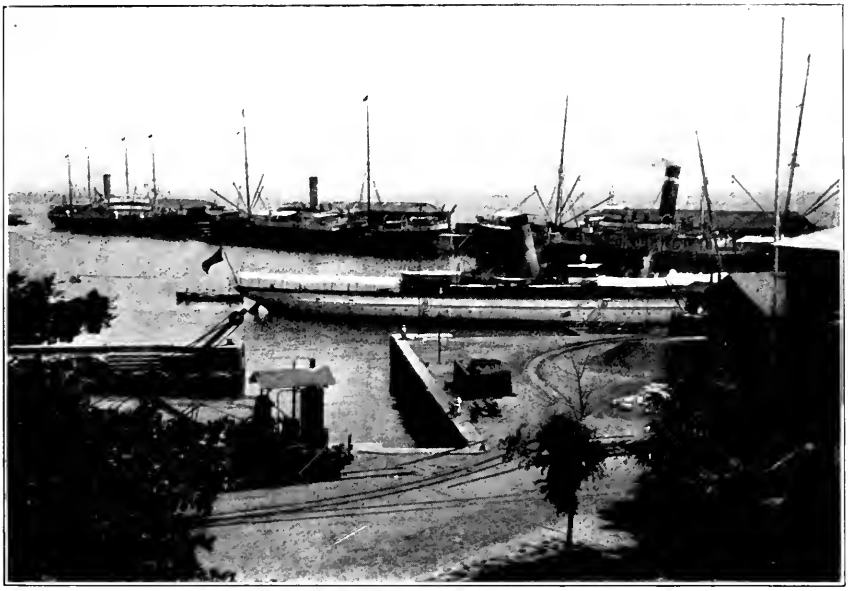
17 miles long is used to transport passengers and freight between the port and Barranquilla. The latter has 40,000 people, and is the headquarters for several fleets of commercial vessels which ply up and down the Magdalena.

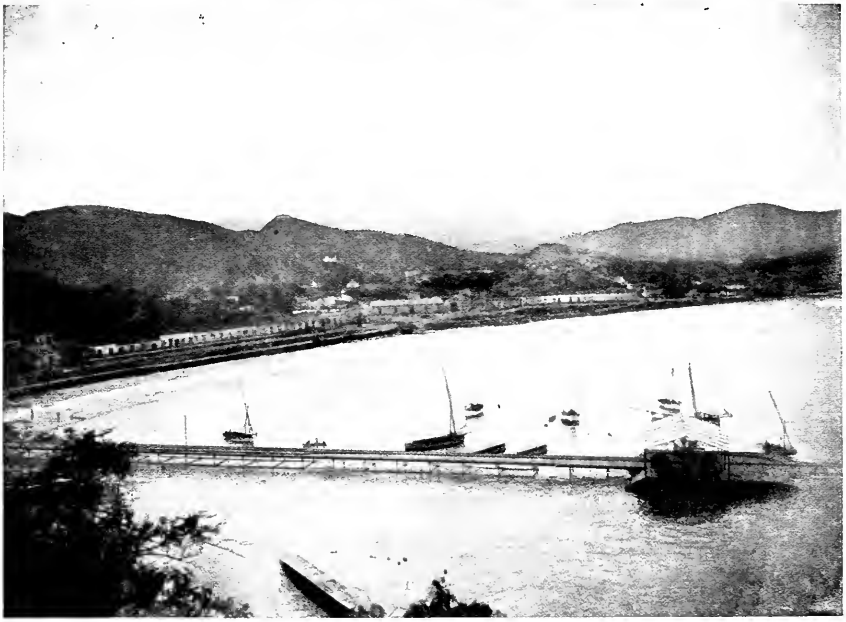
Voyaging eastward, the leading Venezuelan ports are Maracaibo, Puerto Cabello, and La Guaira, the last named ranking first in general importance, with the others in the order mentioned. In each port centers a large amount of raw products destined for world markets, transported thither by railroads and, in the case of Maracaibo, by rail and also by small craft that ply the waters of the lake of the same name. In fact, Maracaibo's export statistics show a larger amount than does any other port of the country. In this region of Venezuela recent years have seen renewed activity in petroleum production, some of the new oil having been used in Caracas and other cities. During the present year crude petroleum will perhaps form a very important article of export from Maracaibo, and the harbor, always alive with coasting and ocean ships, seems destined to a greater trade than ever before. In a recent year Maracaibo exported 29 per cent of the total Venezuelan products sent abroad.

A massive old fortress guards the entrance to the harbor of Puerto Cabello, one of the best and safest of the Republic. The fortress was constructed more than 300 years ago as a protection against the pirates that spread terror along the Venezuelan coast. Large vessels now dock at modern piers and cargo is unloaded and loaded directly from ship to wharf and vice versa. One of the important adjuncts of Puerto Cabello is the floating drydock which can handle a 2,000-ton ship. Its dimensions are 282 feet long, 80 feet wide, and height of walls above pontoon, 21 feet. The dock has already proved invaluable for use of large and small vessels trading along the Venezuelan and Colombian coasts.

Puerto Cabello has about 20,000 population and is the terminus of the railroad from Valencia, 34 miles inland. Along this and connecting railways and through the port passes a large amount of commerce, not the least important being beef cattle for export. A few years ago English capital constructed a modern cold-storage plant at Puerto Cabello for the purpose of slaughtering and packing Venezuelan cattle. The great demand for food has given a renewed impulse to this enterprise and the port's exports during a recent six months period amounted to 23,783 metric tons, a considerable portion of which represented the value of beef and cattle products.

Long before reaching La Guaira, the chief port of Venezuela, the precipitous shore line looms high above the tropical waters, dominated by La Silla (the saddle) and other mountain peaks, the sea and mountain combining to form a pleasing picture. The old method





TWO VENEZUELAN PORTS.

Top: The port of La Guaira, Venezuela. "The old method of anchoring ships in the roadstead has passed and the new breakwaters and piers make it possible for the vessel to land passengers and cargo directly on the docks. A concrete breakwater of recent construction extends for more than 2,000 feet from the shore, and partially incloses an area of nearly 100 acres having an average depth of 28 feet." Bottom: The port of Carupano, situated on the northern coast of Venezuela with a picturesque mountain setting for a background. In the foreground is shown the recently constructed steel pier which extends out into the Caribbean Sea.

THE PORT OF GUANTA, VENEZUELA.

"Guanta, one of the Republic's eastern ports on the Caribbean, has a landlocked harbor and facilities for docking ocean vessels. This port is the outlet for the city of Barcelona, a few miles inland, with which it is connected by rail. Guanta is also the outlet for the coal mines of Naricual, which are destined to more active exploitation as the demand increases."

of anchoring ships in the roadstead has passed and the new breakwaters and piers make it possible for the vessels to land passengers and cargo directly onto docks. A concrete breakwater of recent construction extends more than 2,000 feet from a point on shore, which partially incloses an area of nearly 100 acres, having an average depth of 28 feet. This depth, of course, renders the harbor waters suitable for all kinds of vessels. An English company secured certain concessions from Venezuela and constructed the breakwater under many difficulties, as in numerous cases the depth of water along its course is nearly 50 feet. Other concrete quays and retaining walls offer additional facilities for many smaller ships that trade along the coast of the Republic. On the whole, more than $5,000,000 has been spent on harbor improvements, which include a number of warehouses and modern equipment for handling cargo on a large scale.

A massive structure behind a setting of mangrove and palm trees has long served as a customhouse; and it is to the credit of Venezuelan officials that goods are passed with unusual dispatch. In the year of 1917 the exports and imports of the Republic amounted to more than $46,000,000, a large portion of which was handled by the La Guaira customhouse. About four-fifths of the exports consist of the much needed products of coffee, cocoa, and sugar.

The port of La Guaira is connected by rail with the capital, 23 miles inland but less than 8 miles air line. A highway also leads from the port to the capital and in recent years improvements in this road have made it popular with automobile owners. An electric line connects La Guaira with the summer resort of Macuto, about 6 miles eastward, where sea bathing and cooler breezes combine to make the resort especially attractive to strangers as well as popular with the people of Caracas and surrounding country.

Guanta, one of the Republic's eastern ports on the Caribbean, has a landlocked harbor and facilities for docking ocean vessels. This port is the outlet for Barcelona, a few miles inland, with which it is connected by rail. Guanta is the outlet for the coal mines of Naricual, which are destined to more active exploitation as the demand for fuel increases. Many cattle also are shipped annually from this port.

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